

Key comparisons CCT-K5, CCT-K5.1 and EUROMET.T-K5

MEASURAND : Temperature

NOMINAL TEMPERATURE : $T_{\text{nom}} = 1064 \text{ }^\circ\text{C}$

There are no APMP.T-K5 results to be linked to those of CCT-K5 for this nominal temperature.

Key comparison CCT-K5

Four Tungsten-strip lamps were used as transfer standards for radiance temperature measurements at specific currents corresponding to each nominal temperature T_{nom} . To shorten the measurement time significantly the set of transfer standards was split in two sets of two lamps for simultaneous comparisons in two loops. The pilot of each loop measured both lamp sets in order to establish a linkage mechanism described on page 19 of the CCT-K5 Final Report.

T_i : temperature value measured by laboratory i

u_i : standard uncertainty of T_i

Lamp S/N C564

Lab <i>i</i>	T_i / °C	u_i / °C
VSL	1066.205	0.11
NMIA	1066.165	0.02
KRISS	1066.145	0.10
NIM	-	-
A*STAR	1065.825	0.16
NMIJ	1066.305	0.13
VNIIM	1066.325	0.16

Lamp S/N C860

Lab <i>i</i>	T_i / °C	u_i / °C
NPL	1064.114	0.15
NIST	1064.434	0.26
CENAM	1064.444	0.25
LNE-INM	1063.824	0.16
INRIM	1064.524	0.08
PTB	1064.354	0.17

Lamp S/N C681

Lab <i>i</i>	T_i / °C	u_i / °C
VSL	1066.129	0.11
NMIA	1066.159	0.02
KRISS	1066.269	0.10
NIM	-	-
A*STAR	1065.499	0.16
NMIJ	1066.219	0.13
VNIIM	1065.889	0.16

Lamp S/N C864

Lab <i>i</i>	T_i / °C	u_i / °C
NPL	1064.114	0.15
NIST	1064.424	0.26
CENAM	1064.354	0.25
LNE-INM	1064.134	0.16
INRIM	1064.324	0.08
PTB	1064.144	0.17

Key comparison CCT-K5.1

This is a bilateral comparison between the PTB and the NRC.

T_{NRC} : temperature value measured at the NRC

u_{NRC} : standard uncertainty of T_{NRC}

Lamp C598 $T_{\text{NRC}} = 1064.45 \text{ }^\circ\text{C}$
 $u_{\text{NRC}} = 0.22 \text{ }^\circ\text{C}$

Lamp 644C $T_{\text{NRC}} = 1064.46 \text{ }^\circ\text{C}$
 $u_{\text{NRC}} = 0.22 \text{ }^\circ\text{C}$

Key comparison EUROMET.T-K5

This comparison involved eight participants and was carried out from October 1999 to February 2001.

The two transfer standards were Lamp S/N C564 and Lamp S/N C681 already used in CCT-K5.

The individual laboratory measurements and their uncertainties are given in Tables 5 to 11 of the EUROMET.T-K5 Final Report.

Key comparisons CCT-K5, CCT-K5.1 and EUROMET.T-K5

Key comparison CCT-K5

MEASURAND : Temperature

NOMINAL TEMPERATURE : $T_{\text{nom}} = 1064 \text{ }^\circ\text{C}$

The key comparison reference value T_R for each nominal temperature T_{nom} and each lamp k is calculated on the basis of the median of measured radiance temperatures $T_i(k, T_{\text{nom}})$. Its standard uncertainty, $u(T_R)$, is obtained as the standard uncertainty of the median.

Lamp	$T_R / ^\circ\text{C}$	$u(T_R) / ^\circ\text{C}$
C564	1066.290	0.114
C681	1066.110	0.038
C860	1064.350	0.117
C864	1064.240	0.117

For each temperature T_{nom} the degree of equivalence of laboratory i with respect to the key comparison reference value is given by a pair of terms: D_i and its expanded uncertainty U_i ($k = 2$) both expressed in K. The computation of D_i and U_i is explained in the Addendum to the CCT-K5 Final Report.

For each temperature T_{nom} the pair-wise degree of equivalence between laboratory i and j is given by two terms: D_{ij} and its expanded uncertainty U_{ij} ($k = 2$). The computation of D_{ij} and U_{ij} is also explained in the Addendum of the CCT-K5 Final Report.

Linking key comparison CCT-K5.1 to CCT-K5

The linkage is made through the common participation of PTB in both key comparisons, and is detailed in the CCT-K5 and CCT-K5.1 Linkage Report.

Linking key comparison EUROMET.T-K5 to CCT-K5

The measurements of the EUROMET.T-K5 participants are directly linked to the key comparison reference value obtained in CCT-K5 as the protocols of the two key comparisons are identical and the transfer standards are the same (see in Chapter VII of the EUROMET.T-K5 Final Report).

Degrees of equivalence relative to the CCT-K5 key comparison reference values are computed for each of the transfer standards.

Pair-wise degrees of equivalence inside EUROMET.T-K5 are available in the EUROMET.T-K5 Final Report (Tables 15 to 36).

Key comparisons CCT-K5, CCT-K5.1 and EUROMET.T-K5

MEASURAND : Temperature

NOMINAL TEMPERATURE : $T_{\text{nom}} = 1064 \text{ }^\circ\text{C}$

Degrees of equivalence relative to the CCT-K5 key comparison reference value

Labi	Lamp S/N C564		Lamp S/N C681	
	D_i / K	U_i	D_i / K	U_i
VSL	-0.033	0.257	0.02	0.33
NPL	-0.181	0.329	0.00	0.72
NMIA	-0.038	0.155	-1.45	0.41
KRISS	0.007	0.279	-0.79	1.75
NIM	-	-	-0.81	0.42
A*STAR	-0.538	0.350	-0.55	0.81
NMIJ	0.062	0.291	-0.47	1.10
VNIIM	-0.093	0.365	0.12	0.31
NIST	0.134	0.536		
CENAM	0.104	0.515		
LNE-INM	-0.316	0.401		
INRIM	0.129	0.206		
PTB	-0.046	0.205		
NRC	-0.061	0.597		

Black: participants in CCT-K5

Green: participant in CCT-K5.1

Orange: participants in EUROMET.T-K5 (measurements with Lamp S/N C564)

Grey: participants in EUROMET.T-K5 (measurements with Lamp S/N C681)

Key comparisons CCT-K5 and CCT-K5.1

MEASURAND : Temperature

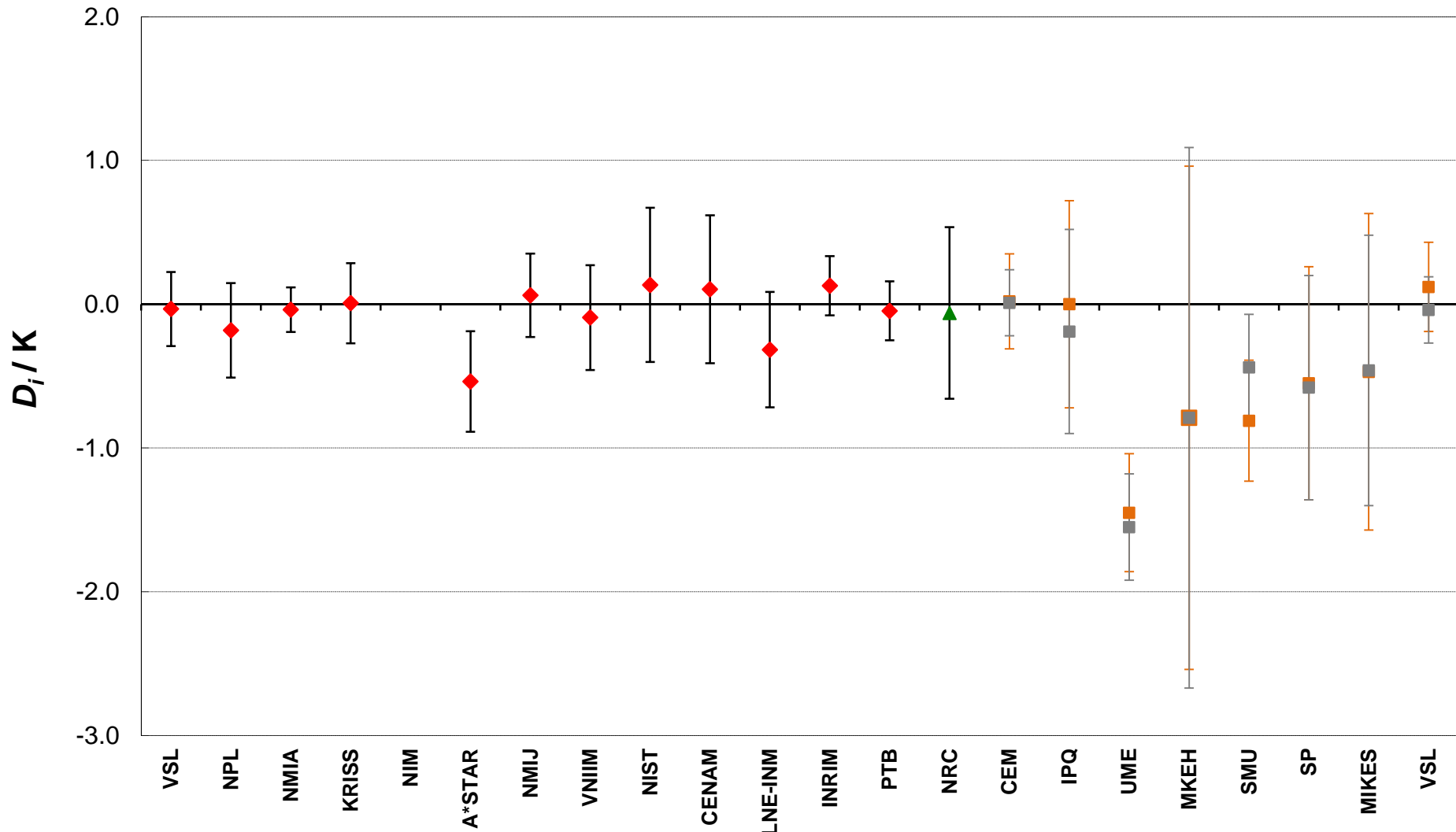
NOMINAL TEMPERATURE : $T_{nom} = 1064 \text{ }^\circ\text{C}$

Matrix of equivalence

Lab _i	D_i / U_i		Lab _j															
	/ K		VSL		NPL		NMIA		KRISS		NIM		A*STAR		NMIJ		VNIIM	
	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}
VSL	-0.033	0.257			0.149	0.410	0.005	0.227	-0.040	0.313	-	-	0.505	0.408	-0.095	0.341	0.060	0.428
NPL	-0.181	0.329	-0.149	0.410			-0.144	0.351	-0.189	0.409	-	-	0.357	0.473	-0.244	0.433	-0.089	0.477
NMIA	-0.038	0.155	-0.005	0.227	0.144	0.351			-0.045	0.214	-	-	0.500	0.360	-0.100	0.266	0.055	0.387
KRISS	0.007	0.279	0.040	0.313	0.189	0.409	0.045	0.214			-	-	0.545	0.439	-0.055	0.344	0.100	0.470
NIM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A*STAR	-0.538	0.350	-0.505	0.408	-0.357	0.473	-0.500	0.360	-0.545	0.439	-	-			-0.600	0.429	-0.445	0.456
NMIJ	0.062	0.291	0.095	0.341	0.244	0.433	0.100	0.266	0.055	0.344	-	-	0.600	0.429			0.155	0.448
VNIIM	-0.093	0.365	-0.060	0.428	0.089	0.477	-0.055	0.387	-0.100	0.470	-	-	0.445	0.456	-0.155	0.448		
NIST	0.134	0.536	0.167	0.590	0.315	0.600	0.172	0.551	0.127	0.589	-	-	0.672	0.635	0.072	0.606	0.227	0.638
CENAM	0.104	0.515	0.137	0.573	0.285	0.585	0.142	0.531	0.097	0.571	-	-	0.642	0.618	0.042	0.589	0.197	0.621
LNE-INM	-0.316	0.401	-0.284	0.441	-0.135	0.466	-0.279	0.387	-0.324	0.439	-	-	0.222	0.500	-0.379	0.462	-0.224	0.503
INRIM	0.129	0.206	0.162	0.322	0.310	0.354	0.167	0.243	0.122	0.320	-	-	0.667	0.399	0.067	0.351	0.222	0.404
PTB	-0.046	0.205	-0.014	0.441	0.135	0.465	-0.009	0.386	-0.054	0.439	-	-	0.492	0.499	-0.109	0.462	0.047	0.502
NRC	-0.061	0.597	-0.028	0.650	0.120	0.682	-0.023	0.617	-0.068	0.659	-	-	0.477	0.692	-0.123	0.664	0.032	0.700

Lab _i	D_i / U_i		Lab _j										NRC	
	/ K		NIST		CENAM		LNE-INM		INRIM		PTB		D_{ij}	U_{ij}
	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	D_{ij}	U_{ij}	/ K	/ K
VSL	-0.033	0.257	-0.167	0.590	-0.137	0.573	0.284	0.441	-0.162	0.322	0.014	0.441	0.028	0.650
NPL	-0.181	0.329	-0.315	0.600	-0.285	0.585	0.135	0.466	-0.310	0.354	-0.135	0.465	-0.120	0.682
NMIA	-0.038	0.155	-0.172	0.551	-0.142	0.531	0.279	0.387	-0.167	0.243	0.009	0.386	0.023	0.617
KRISS	0.007	0.279	-0.127	0.589	-0.097	0.571	0.324	0.439	-0.122	0.320	0.054	0.439	0.068	0.659
NIM	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A*STAR	-0.538	0.350	-0.672	0.635	-0.642	0.618	-0.222	0.500	-0.667	0.399	-0.492	0.499	-0.477	0.692
NMIJ	0.062	0.291	-0.072	0.606	-0.042	0.589	0.379	0.462	-0.067	0.351	0.109	0.462	0.123	0.664
VNIIM	-0.093	0.365	-0.227	0.638	-0.197	0.621	0.224	0.503	-0.222	0.404	-0.047	0.502	-0.032	0.700
NIST	0.134	0.536			0.030	0.722	0.450	0.632	0.005	0.552	0.180	0.629	0.195	0.803
CENAM	0.104	0.515	-0.030	0.722			0.420	0.627	-0.025	0.528	0.150	0.608	0.165	0.789
LNE-INM	-0.316	0.401	-0.450	0.632	-0.420	0.627			-0.445	0.440	-0.270	0.534	-0.255	0.719
INRIM	0.129	0.206	-0.005	0.552	0.025	0.528	0.445	0.440			0.175	0.376	0.190	0.632
PTB	-0.046	0.205	-0.180	0.629	-0.150	0.608	0.270	0.534	-0.175	0.376			0.015	0.631
NRC	-0.061	0.597	-0.195	0.803	-0.165	0.789	0.255	0.719	-0.190	0.632	-0.015	0.631		

**CCT-K5, CCT-K5.1 and EUROMET.T-K5 : Nominal temperature, $T_{nom} = 1064\text{ °C}$
 Degrees of equivalence, D_i , and expanded uncertainties ($k = 2$) U_i , expressed in K**



Red diamonds: participants in CCT-K5
Green triangle: participant in CCT-K5.1

Orange squares: participants in EUROMET.T-K5 (measurements with Lamp S/N C564)
Grey squares: participants in EUROMET.T-K5 (measurements with Lamp S/N C681)