

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

MEASURAND : Temperature

NOMINAL TEMPERATURE : $T_{\text{nom}} = 961 \text{ }^{\circ}\text{C}$

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	964.050	0.10
NMIA	963.950	0.02
KRISS	963.910	0.09
NIM	964.070	0.11
A*STAR	963.690	0.15
NMIJ	964.070	0.12
VNIIM	964.660	0.16

Lamp S/N C860

Lab <i>i</i>	T_i / °C	u_i / °C
NPL	962.000	0.14
NIST	-	-
CENAM	962.260	0.21
LNE-INM	961.710	0.13
INRIM	962.360	0.07
PTB	962.340	0.15

Lamp S/N C681

Lab <i>i</i>	T_i / °C	u_i / °C
VSL	963.550	0.10
NMIA	963.480	0.02
KRISS	963.610	0.09
NIM	963.660	0.11
A*STAR	962.970	0.15
NMIJ	963.570	0.12
VNIIM	964.070	0.16

Lamp S/N C864

Lab <i>i</i>	T_i / °C	u_i / °C
NPL	962.130	0.14
NIST	-	-
CENAM	962.300	0.21
LNE-INM	962.080	0.13
INRIM	962.240	0.07
PTB	962.140	0.15

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 $T_{\text{NRC}} = 962.22 \text{ }^\circ\text{C}$
 $u_{\text{NRC}} = 0.19 \text{ }^\circ\text{C}$

Lamp 644C $T_{\text{NRC}} = 962.22 \text{ }^\circ\text{C}$
 $u_{\text{NRC}} = 0.19 \text{ }^\circ\text{C}$

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 : $T_{\text{nom}} = 961 \text{ }^\circ\text{C}$

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	$T_R / \text{ }^\circ\text{C}$	$u(T_R) / \text{ }^\circ\text{C}$
C564	964.115	0.096
C681	963.505	0.057
C860	962.219	0.155
C864	962.159	0.257

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 : $T_{\text{nom}} = 961 \text{ }^\circ\text{C}$

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

Labi	Lamp S/N C564		Lamp S/N C681		
	D_i	U_i	D_i	U_i	
	/ K		/ K		
VSL	-0.010	0.227	CEM	-0.01	0.23
NPL	-0.124	0.310	IPQ	-0.07	0.63
NMIA	-0.095	0.123	UME	-1.30	0.32
KRISS	-0.050	0.255	MKEH	-0.51	3.40
NIM	0.055	0.259	SMU	-0.40	0.55
A*STAR	-0.480	0.319	SP	-0.47	0.67
NMIJ	0.010	0.263	MIKES	-0.50	0.85
VNIIM	0.555	0.333	VSL	-0.04	0.23
NIST	-	-			
CENAM	0.091	0.433			
LNE-INM	-0.294	0.350			
INRIM	0.111	0.171			
PTB	0.051	0.169			
NRC	0.131	0.511			

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

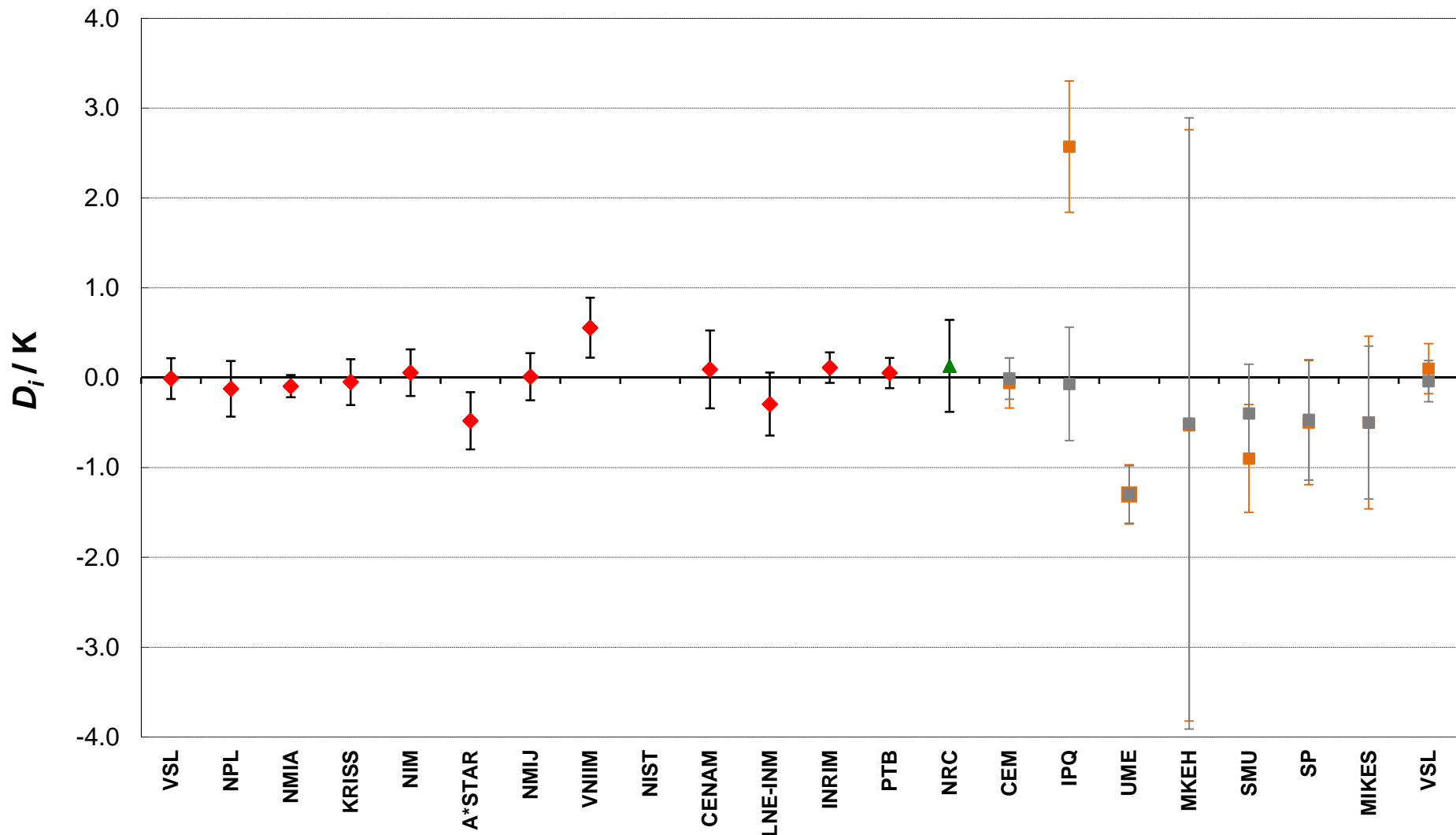
NOMINAL TEMPERATURE : $T_{nom} = 961 \text{ }^\circ\text{C}$

Matrix of equivalence

Lab _i	D_i / K		VSL		NPL		NMIA		KRISS		NIM		A*STAR		NMIJ		VNIIM	
	U_i	$/K$	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	0.227	-0.010			0.113	0.408	0.085	0.205	0.040	0.287	-0.065	0.300	0.470	0.377	-0.020	0.312	-0.565	0.380
NPL	0.310	-0.124	-0.113	0.408			-0.028	0.359	-0.073	0.407	-0.178	0.421	0.357	0.465	-0.133	0.429	-0.678	0.477
NMIA	0.123	-0.095	-0.085	0.205	0.028	0.359			-0.045	0.203	-0.150	0.226	0.385	0.328	-0.105	0.243	-0.650	0.328
KRISS	0.255	-0.050	-0.040	0.287	0.073	0.407	0.045	0.203			-0.105	0.289	0.430	0.408	-0.060	0.316	-0.605	0.395
NIM	0.259	0.055	0.065	0.300	0.178	0.421	0.150	0.226	0.105	0.289			0.535	0.403	0.045	0.329	-0.500	0.398
A*STAR	0.319	-0.480	-0.470	0.377	-0.357	0.465	-0.385	0.328	-0.430	0.408	-0.535	0.403			-0.490	0.399	-1.035	0.444
NMIJ	0.263	0.010	0.020	0.312	0.133	0.429	0.105	0.243	0.060	0.316	-0.045	0.329	0.490	0.399			-0.545	0.403
VNIIM	0.333	0.555	0.565	0.380	0.678	0.477	0.650	0.328	0.605	0.395	0.500	0.398	1.035	0.444	0.545	0.403		
NIST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CENAM	0.433	0.091	0.102	0.512	0.215	0.507	0.187	0.474	0.142	0.512	0.037	0.522	0.572	0.559	0.082	0.529	-0.463	0.569
LNE-INM	0.350	-0.294	-0.283	0.410	-0.170	0.400	-0.198	0.360	-0.243	0.409	-0.348	0.423	0.187	0.467	-0.303	0.431	-0.848	0.478
INRIM	0.171	0.111	0.122	0.324	0.235	0.337	0.207	0.259	0.162	0.323	0.057	0.339	0.592	0.394	0.102	0.350	-0.443	0.407
PTB	0.169	0.051	0.062	0.420	0.175	0.442	0.147	0.372	0.102	0.420	-0.003	0.433	0.532	0.476	0.042	0.441	-0.503	0.488
NRC	0.511	0.131	0.141	0.559	0.255	0.597	0.226	0.525	0.181	0.570	0.076	0.572	0.611	0.602	0.121	0.574	-0.424	0.610

Lab _i	D_i / K		NIST		CENAM		LNE-INM		INRIM		PTB		NRC	
	U_i	$/K$	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	0.227	-0.010	-	-	-0.102	0.512	0.283	0.410	-0.122	0.324	-0.062	0.420	-0.141	0.559
NPL	0.310	-0.124	-	-	-0.215	0.507	0.170	0.400	-0.235	0.337	-0.175	0.442	-0.255	0.597
NMIA	0.123	-0.095	-	-	-0.187	0.474	0.198	0.360	-0.207	0.259	-0.147	0.372	-0.226	0.525
KRISS	0.255	-0.050	-	-	-0.142	0.512	0.243	0.409	-0.162	0.323	-0.102	0.420	-0.181	0.570
NIM	0.259	0.055	-	-	-0.037	0.522	0.348	0.423	-0.057	0.339	0.003	0.433	-0.076	0.572
A*STAR	0.319	-0.480	-	-	-0.572	0.559	-0.187	0.467	-0.592	0.394	-0.532	0.476	-0.611	0.602
NMIJ	0.263	0.010	-	-	-0.082	0.529	0.303	0.431	-0.102	0.350	-0.042	0.441	-0.121	0.574
VNIIM	0.333	0.555	-	-	0.463	0.569	0.848	0.478	0.443	0.407	0.503	0.488	0.424	0.610
NIST	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CENAM	0.433	0.091	-	-			0.385	0.521	-0.020	0.450	0.040	0.530	-0.040	0.669
LNE-INM	0.350	-0.294	-	-	-0.385	0.521			-0.405	0.383	-0.345	0.489	-0.425	0.619
INRIM	0.171	0.111	-	-	0.020	0.450	0.405	0.383			0.060	0.333	-0.020	0.538
PTB	0.169	0.051	-	-	-0.040	0.530	0.345	0.489	-0.060	0.333			-0.080	0.538
NRC	0.511	0.131	-	-	0.040	0.669	0.425	0.619	0.020	0.538	0.080	0.538		

CCT-K5, CCT-K5.1 and EUROMET.T-K5 : Nominal temperature, $T_{\text{nom}} = 961 \text{ }^\circ\text{C}$
 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)