Key comparisons CCT-K7, EUROMET.T-K7, COOMET.T-K7, EURAMET.T-K7.2, EURAMET.T-K7.3, EURAMET.T-K7.1 and APMP.T-K7.1

Key comparison CCT-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

x_i: **temperature difference between the national reference of laboratory *i* and the BIPM reference, *T* (Lab *i*) - *T* (BIPM), where *T* is the temperature**

u_i: **combined standard uncertainty of x_i**

Lab *i*	x_i / µK	u_i / µK
BIPM	0	44
LNE-INM	-54	66
CEM	-14	41
CENAM	-5	27
NMISA	105	74
NMIA	-29	34
INRIM	-15	27
IPQ	40	160
KRISS	69	56
MSL	117	16
NIM	33	61
NIST	-40	33
NMIJ	54	151
NMi-VSL	16	55
NPL	45	39
NRC	85	23
PTB	-14	56
SMU	69	53
A*STAR	34	71
UME	-53	91
VNIIM	22	46

Key comparison EUROMET.T-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

$x_{i\,EUR}$: **temperature difference between the national reference of laboratory *i* and the NMi-VSL reference cell (VSL-094), *T* (Lab *i*) - *T* (VSL-094), where *T* is the temperature**

$u_{i\,EUR}$: **combined standard uncertainty of $x_{i\,EUR}$**

Lab *i*	$x_{i\,EUR}$ / µK	$u_{i\,EUR}$ / µK
INM(RO)	-3	64
MKEH	-77	69
EIM	45	113
MIKES	-17	65
PTB	39	37
DTI	-51	68
JV	-146	194
VNIIM	63	52
DZM/LPM	10	50
UME	-86	77
DMDM	-151	119
BEV	-20	174
IPQ	30	80
NML(IE)	40	106
CMI	-310	61
GUM	-309	75
VMT/PFI	-62	119
CEM	51	44
INRIM	2	29
LNE-INM	16	56
MIRS/FE-LMK	33	25
SMD	44	34
SMU	-4	58
NMi-VSL	14	28

Key comparison COOMET.T-K7 **MEASURAND : Temperature of triple point of water** **NOMINAL VALUE : 273.16 K**

The comparison was performed in three stages: 1) each participating laboratory carried out comparisons of the transfer cell with its national standard cell in local conditions; 2) the transfer cells were forwarded together with measurement results to BelGIM, where they were compared with the standard BelGIM cell using its laboratory equipment; and 3) the transfer cells were sent back to laboratories, where they were compared again to the national standard cells in order to determine the stability of the transfer cells.

The measurement results of the participating laboratories are given in section 2, 3, and 4 of the COOMET.T-K7 Final Report.

Key comparison EURAMET.T-K7.2 **MEASURAND : Temperature of triple point of water** **NOMINAL VALUE : 273.16 K**

The measurement results of this bilateral key comparison between VSL (The Netherlands) and INTiBS (Poland), carried out in 2010, are summarized in Sections 3 and 4, on pages 5 and 6 of the EURAMET.T-K7.2 Final Report.
They lead to the following numbers:
$T^{\mathrm{INTiBS}}_{\mathrm{Nat.\ Ref.}} - T^{\mathrm{VSL}}_{\mathrm{Nat.\ Ref.}}$ **= 2.9 µK and associated combined standard uncertainty (*k* = 1) *u* = 46 µK**, where "Nat. Ref." stands for "National Reference".

Key comparison EURAMET.T-K7.3 **MEASURAND : Temperature of triple point of water** **NOMINAL VALUE : 273.16 K**

The measurement results of this bilateral key comparison between VSL (The Netherlands) and GUM (Poland), carried out in 2011, are summarized in Sections 3 and 4, on pages 5 and 6 of the EURAMET.T-K7.3 Final Report.
They lead to the following numbers:
$T^{\mathrm{GUM}}_{\mathrm{Nat.\ Ref.}} - T^{\mathrm{VSL}}_{\mathrm{Nat.\ Ref.}}$ **= 11.5 µK and associated combined standard uncertainty (*k* = 1) *u* = 60 µK**, where "Nat. Ref." stands for "National Reference".

Key comparison EURAMET.T-K7.1 **MEASURAND : Temperature of triple point of water** **NOMINAL VALUE : 273.16 K**

The measurement results of this bilateral key comparison between CMI (Czech Republic) and SMU (Slovakia), carried out in 2009, are summarized in Sections 2 and 3 of the EURAMET.T-K7.1 Final Report.
It should be noted that SMU replaced its national reference cell with a cell with known isotopic composition after completion of key comparison EUROMET.T-K7.

Key comparison APMP.T-K7.1 **MEASURAND : Temperature of triple point of water** **NOMINAL VALUE : 273.16 K**

The measurement results of this bilateral key comparison between VMI-STAMEQ (Viet Nam) and NMIJ (Japan), carried out in 2014 - 2015, are summarized in Sections 3 to 6 of the APMP.T-K7.1 Final Report.
They lead to the following numbers:
$T^{\mathrm{VMI\text{-}STAMEQ}}_{\mathrm{Nat.\ Ref.}} - T^{\mathrm{NMIJ}}_{\mathrm{Nat.\ Ref.}}$ **= -19.9 µK and associated combined standard uncertainty (*k* = 1) *u* = 46.3 µK**, where "Nat. Ref." stands for "National Reference".

Key comparisons CCT-K7, EUROMET.T-K7, COOMET.T-K7, EURAMET.T-K7.2, EURAMET.T-K7.3, EURAMET.T-K7.1 and APMP.T-K7.1

MEASURAND : Temperature of triple point of water **NOMINAL VALUE : 273.16 K**

Key comparison CCT-K7

The key comparison reference value, x_R, is calculated as the arithmetic mean of the results, x_i, from all participants, including some laboratories who made corrections for the influence of chemical impurities and isotopic composition, and some who did not. x_R = 22 µK (expressed as the difference from the BIPM value).
The uncertainty of x_R, u_R, is calculated as the standard deviation of the mean of the data set. u_R = 11 µK. Because the distribution of the pooled data is multimodal, care should be taken when using this quantity for calculating confidence intervals.

The degree of equivalence of laboratory *i* with respect to the key comparison reference value is given by a pair of terms: $D_i = x_i - x_R$, and its expanded uncertainty U_i (k = 2), both expressed in µK. The uncertainty includes the participant's uncertainty, the comparison uncertainty and the uncertainty of the key comparison reference value.

The degree of equivalence between two laboratories *i* and *j* is given by a pair of terms: $D_{ij} = (D_i - D_j) = (x_i - x_j)$ and its expanded uncertainty U_{ij} (k = 2), both expressed in µK. U_{ij} includes both participants' uncertainties and twice the comparison uncertainty.

Key comparison EUROMET.T-K7

The EUROMET reference value referred to the NMi-VSL reference cell (VSL-094), $x_{R\,EUR}$, and its standard uncertainty, $u_{R\,EUR}$, are computed from the weighted mean of the individual results, with the exclusion of the CMI and GUM results, as explained in Section 7.1 on page 29 of the EUROMET.T-K7 Final Report: $x_{R\,EUR}$ = 15.6 µK, and $u_{R\,EUR}$ = 10.5 µK.

The degree of equivalence of laboratory *i*, participant in EUROMET.T-K7, with respect to the EUROMET reference value is given by a pair of terms: $D_{i\,EUR} = x_{i\,EUR} - x_{R\,EUR}$, and its expanded uncertainty $U_{i\,EUR}$ (k = 2), both expressed in µK.

Linking EUROMET.T-K7 to CCT-K7

The linkage process of EUROMET.T-K7 results to those of CCT-K7 is explained in Section 7.3 on page 36 of the EUROMET.T-K7 Final Report. It is based on the common participation of CEM, IPQ, LNE-INM, NMi-VSL, and SMU in both comparisons.

The degree of equivalence of laboratory *i*, participant in EUROMET.T-K7, with respect to the CCT-K7 reference value is given by a pair of terms: $D_i = D_{i\,EUR}$ + 64.7 µK, and its expanded uncertainty (k = 2) $U_i = 2[(U_{i\,EUR}/2)^2 + (19.7)^2]^{1/2}$, both expressed in µK.

Pair-wise degrees of equivalence are computed inside EUROMET (see Section 7.2 on page 30 of the EUROMET.T-K7 Final Report).

Linking COOMET.T-K7 to CCT-K7

The linkage process of COOMET.T-K7 results to those of CCT-K7 is explained in Section 6 of the COOMET.T-K7 Final Report. It is based on the common participation of VNIIM in both comparisons.

The degree of equivalence of laboratory *i* , participant in COOMET.T-K7, with respect to the CCT-K7 reference value is given by a pair of terms: $D_{i,}$ and its expanded uncertainty (k = 2) U_i , both expressed in µK.

No pair-wise degrees of equivalence are computed inside COOMET.T-K7.

Linking EURAMET.T-K7.2 to CCT-K7

The degree of equivalence of INTiBS relative to the CCT-K7 key comparison reference value is computed through the common participation of VSL in EURAMET.T-K7.2 and EUROMET.T-K7 (see Section 6 of the EURAMET.T-K7.2 Final Report).

Linking EURAMET.T-K7.3 to CCT-K7

The degree of equivalence of GUM relative to the CCT-K7 key comparison reference value is computed through the common participation of VSL in EURAMET.T-K7.3 and EUROMET.T-K7 (see Sections 6 and 7 of the EURAMET.T-K7.3 Final Report).

Linking EURAMET.T-K7.1 to CCT-K7

New degrees of equivalence relative to the CCT-K7 key comparison reference value are obtained in EURAMET.T-K7.1 for SMU and CMI, through the common participation of SMU in EURAMET.T-K7.1 and EUROMET.T-K7, taking into account the change of national reference cell at SMU since the completion of EUROMET.T-K7.

Linking APMP.T-K7.1 to CCT-K7

The degree of equivalence of VMI-STAMEQ relative to the CCT-K7 key comparison reference value is computed through the common participation of NMIJ in APMP.T-K7 and CCT-K7 (see Section 8 of the APMP.T-K7.1 Final Report).

Key comparisons CCT-K7, EUROMET.T-K7, COOMET.T-K7, EURAMET.T-K7.2, EURAMET.T-K7.3, EURAMET.T-K7.1 and APMP.T-K7.1

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Degrees of equivalence relative to the CCT-K7 key comparison reference value

Lab *i* ⇩	D_i / µK	U_i / µK
BIPM	-22	90
LNE-INM	-76	134
CEM	-36	85
CENAM	-27	58
NMISA	83	150
NMIA	-51	72
INRIM	-37	58
IPQ	18	322
KRISS	47	115
MSL	95	39
NIM	11	124
NIST	-62	69
NMIJ	32	304
NMi-VSL	-6	113
NPL	23	81
NRC	62	52
PTB	-37	113
SMU	47	109
A*STAR	11	144
UME	-75	183
VNIIM	0	94

	D_i / µK	U_i / µK
INM(RO)	46	136
MKEH	-28	145
EIM	95	230
MIKES	33	137
PTB	88	86
DTI	-2	145
JV	-97	390
VNIIM	112	113
DZM/LPM	59	110
UME	-37	161
DMDM	-101	242
BEV	29	352
IPQ	79	166
NML(IE)	89	212
CMI	-261	130
GUM	-260	155
VMT/PFI	-13	243
CEM	100	98
INRIM	51	73
LNE-INM	65	120
MIRS/FE-LMK	82	68
SMD	94	82
SMU	45	124
NMi-VSL	63	72

INTiBS	66	118

GUM	75	140

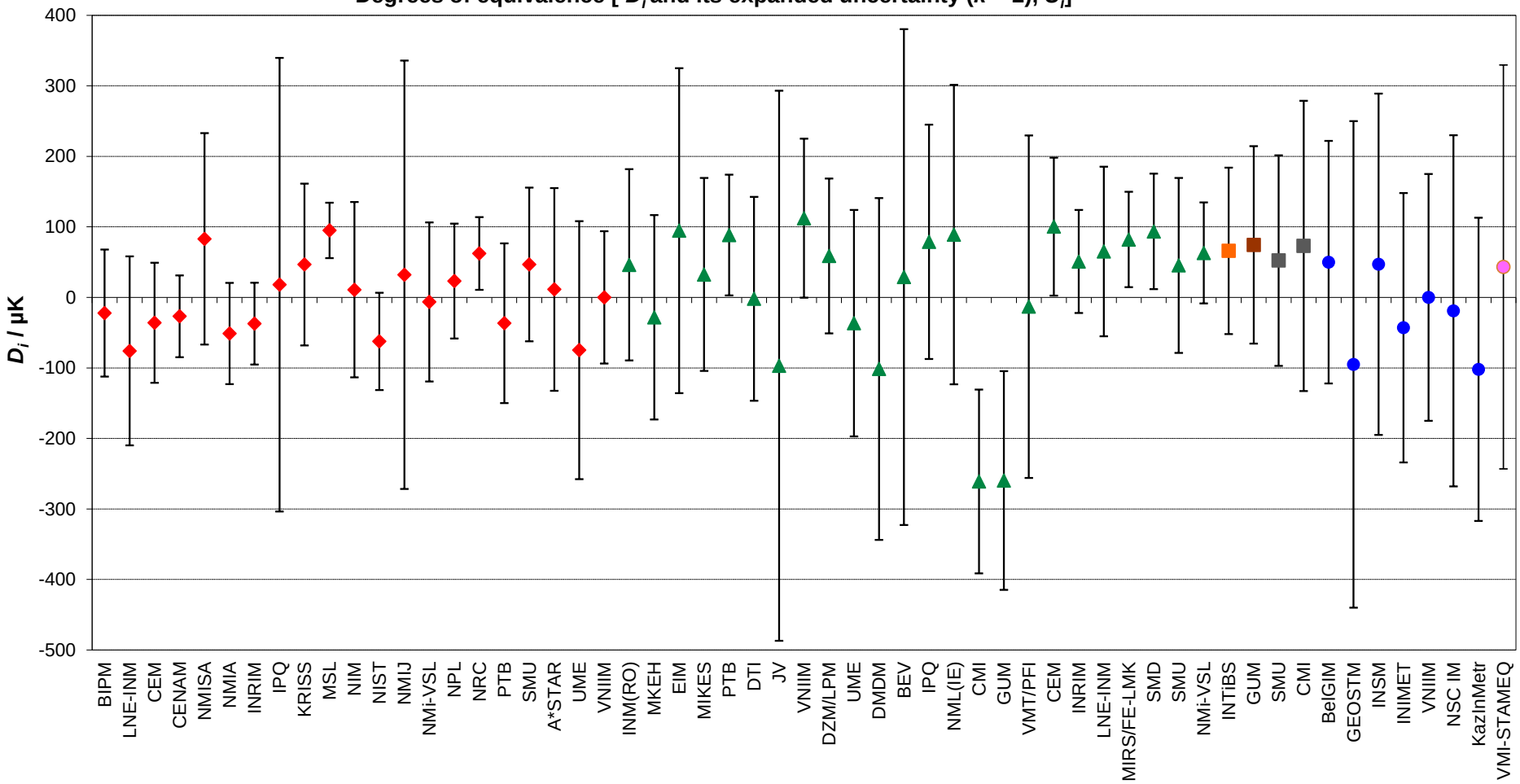
	D_i / µK	U_i / µK
BelGIM	50	172
GEOSTM	-95	345
INSM	47	242
INIMET	-43	191
VNIIM	0	175
NSC IM	-19	249
KazInMetr	-102	215

SMU	52	149
CMI	73	206

VMI-STAMEQ	43	286

Black: participants in CCT-K7
Green: participants in EUROMET.T-K7
Blue: participants in COOMET.T-K7
Orange: participant in EURAMET.T-K7.2
Braun: participant in EURAMET.T-K7.3
Grey: participants in EURAMET.T-K7.1
Pink: participants in APMP.T-K7.1

CCT-K7, EUROMET.T-K7, EURAMET.T-K7.2, 7.3 & 7.1, COOMET.T-K7 and APMP.T-K7.1
Water triple point cells
Degrees of equivalence [D_i and its expanded uncertainty (k = 2), U_i]



Red diamonds: CCT-K7 participants Green triangles: EUROMET.T-K7 participants Blue circles: COOMET.T-K7 participants Orange, braun and grey squares: EURAMET.T-K7.2, EURAMET.T-K7.3 and EURAMET.T-K7.1 participants Pink circle: APMP.T-K7.1 participant
In CCT-K7, NMISA, MSL and NRC realized systematically higher temperatures, because they are the only laboratories which based their realizations on the recommendation of the *Supplementary Information for the ITS-90* to use water with the isotopic composition of the standard mean ocean water. Since the publication of CCT-K7 results, the CIPM approved Recommendation 2 (CI-2005) "Clarification of the definition of the kelvin, unit of thermodynamic temperature": see on pages 23 and 24 of the EUROMET.T-K7 Final Report for detailed

Key comparison CCT-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence

Lab *j* ⟹

Lab *i* ⇩	D_i / µK	U_i / µK	**BIPM** D_{ij} / µK	**BIPM** U_{ij} / µK	**LNE-INM** D_{ij} / µK	**LNE-INM** U_{ij} / µK	**CEM** D_{ij} / µK	**CEM** U_{ij} / µK	**CENAM** D_{ij} / µK	**CENAM** U_{ij} / µK	**NMISA** D_{ij} / µK	**NMISA** U_{ij} / µK	**NMIA** D_{ij} / µK	**NMIA** U_{ij} / µK
BIPM	**-22**	90			**54**	158	**14**	120	**5**	103	**-105**	172	**29**	111
LNE-INM	**-76**	134	**-54**	158			**-40**	156	**-49**	143	**-159**	199	**-25**	149
CEM	**-36**	85	**-14**	120	**40**	156			**-9**	98	**-119**	170	**15**	107
CENAM	**-27**	58	**-5**	103	**49**	143	**9**	98			**-110**	158	**24**	87
NMISA	**83**	150	**105**	172	**159**	199	**119**	170	**110**	158			**134**	163
NMIA	**-51**	72	**-29**	111	**25**	149	**-15**	107	**-24**	87	**-134**	163		
INRIM	**-37**	58	**-15**	103	**39**	143	**-1**	98	**-10**	76	**-120**	158	**14**	87
IPQ	**18**	322	**40**	333	**94**	347	**54**	331	**45**	325	**-65**	354	**69**	328
KRISS	**47**	115	**69**	143	**122**	174	**83**	139	**73**	125	**-36**	186	**98**	132
MSL	**95**	39	**117**	93	**171**	136	**131**	88	**122**	63	**12**	152	**146**	76
NIM	**11**	124	**33**	150	**87**	180	**47**	147	**38**	134	**-72**	192	**62**	140
NIST	**-62**	69	**-40**	109	**13**	147	**-26**	105	**-36**	85	**-145**	162	**-11**	95
NMIJ	**32**	304	**54**	315	**108**	331	**68**	314	**59**	308	**-51**	337	**83**	311
NMi-VSL	**-6**	113	**16**	141	**69**	172	**30**	138	**20**	123	**-90**	185	**45**	130
NPL	**23**	81	**45**	117	**99**	154	**59**	114	**50**	95	**-60**	168	**74**	104
NRC	**62**	52	**84**	99	**138**	140	**98**	95	**89**	71	**-21**	155	**114**	83
PTB	**-37**	113	**-14**	141	**39**	173	**-1**	138	**-10**	123	**-120**	185	**15**	130
SMU	**47**	109	**69**	138	**123**	170	**83**	135	**74**	119	**-36**	183	**98**	127
A*STAR	**11**	144	**34**	167	**87**	194	**47**	164	**38**	152	**-72**	205	**63**	158
UME	**-75**	183	**-53**	202	**1**	225	**-39**	199	**-48**	189	**-158**	234	**-24**	194
VNIIM	**0**	94	**22**	126	**76**	161	**36**	123	**27**	106	**-83**	174	**51**	114

Key comparison CCT-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence (Cont.)

Lab *j* ⟹

Lab *i* ⇩	D_i / µK	U_i / µK	INRIM D_{ij} / µK	INRIM U_{ij} / µK	IPQ D_{ij} / µK	IPQ U_{ij} / µK	KRISS D_{ij} / µK	KRISS U_{ij} / µK	MSL D_{ij} / µK	MSL U_{ij} / µK	NIM D_{ij} / µK	NIM U_{ij} / µK	NIST D_{ij} / µK	NIST U_{ij} / µK
BIPM	**-22**	90	**15**	103	**-40**	333	**-69**	143	**-117**	93	**-33**	150	**40**	109
LNE-INM	**-76**	134	**-39**	143	**-94**	347	**-122**	174	**-171**	136	**-87**	180	**-13**	147
CEM	**-36**	85	**1**	98	**-54**	331	**-83**	139	**-131**	88	**-47**	147	**26**	105
CENAM	**-27**	58	**10**	76	**-45**	325	**-73**	125	**-122**	63	**-38**	134	**36**	85
NMISA	**83**	150	**120**	158	**65**	354	**36**	186	**-12**	152	**72**	192	**145**	162
NMIA	**-51**	72	**-14**	87	**-69**	328	**-98**	132	**-146**	76	**-62**	140	**11**	95
INRIM	**-37**	58			**-55**	325	**-84**	125	**-132**	63	**-48**	134	**25**	85
IPQ	**18**	322	**55**	325			**-29**	340	**-77**	323	**7**	343	**80**	327
KRISS	**47**	115	**84**	125	**29**	340			**-48**	117	**36**	166	**109**	130
MSL	**95**	39	**132**	63	**77**	323	**48**	117			**84**	127	**157**	73
NIM	**11**	124	**48**	134	**-7**	343	**-36**	166	**-84**	127			**73**	139
NIST	**-62**	69	**-25**	85	**-80**	327	**-109**	130	**-157**	73	**-73**	139		
NMIJ	**32**	304	**69**	308	**14**	441	**-14**	323	**-63**	305	**21**	327	**95**	310
NMi-VSL	**-6**	113	**31**	123	**-24**	339	**-53**	158	**-101**	115	**-17**	165	**56**	129
NPL	**23**	81	**60**	95	**5**	330	**-23**	137	**-72**	85	**12**	145	**86**	102
NRC	**62**	52	**99**	71	**44**	324	**16**	122	**-33**	57	**51**	131	**125**	80
PTB	**-37**	113	**1**	123	**-55**	340	**-83**	158	**-132**	116	**-48**	165	**26**	129
SMU	**47**	109	**84**	119	**29**	338	**0**	155	**-48**	112	**36**	162	**109**	125
A*STAR	**11**	144	**48**	152	**-7**	351	**-35**	181	**-84**	146	**0**	187	**74**	156
UME	**-75**	183	**-38**	189	**-93**	369	**-121**	214	**-170**	184	**-86**	219	**-12**	193
VNIIM	**0**	94	**37**	106	**-18**	334	**-47**	145	**-95**	97	**-11**	153	**62**	112

Key comparison CCT-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence (Cont.)

Lab *j* ⟹

Lab *i* ⇩	D_i / µK	U_i / µK	NMIJ D_{ij} / µK	NMIJ U_{ij} / µK	NMi-VSL D_{ij} / µK	NMi-VSL U_{ij} / µK	NPL D_{ij} / µK	NPL U_{ij} / µK	NRC D_{ij} / µK	NRC U_{ij} / µK	PTB D_{ij} / µK	PTB U_{ij} / µK	SMU D_{ij} / µK	SMU U_{ij} / µK
BIPM	**-22**	90	**-54**	315	**-16**	141	**-45**	117	**-84**	99	**14**	141	**-69**	138
LNE-INM	**-76**	134	**-108**	331	**-69**	172	**-99**	154	**-138**	140	**-39**	173	**-123**	170
CEM	**-36**	85	**-68**	314	**-30**	138	**-59**	114	**-98**	95	**1**	138	**-83**	135
CENAM	**-27**	58	**-59**	308	**-20**	123	**-50**	95	**-89**	71	**10**	123	**-74**	119
NMISA	**83**	150	**51**	337	**90**	185	**60**	168	**21**	155	**120**	185	**36**	183
NMIA	**-51**	72	**-83**	311	**-45**	130	**-74**	104	**-114**	83	**-15**	130	**-98**	127
INRIM	**-37**	58	**-69**	308	**-31**	123	**-60**	95	**-99**	71	**-1**	123	**-84**	119
IPQ	**18**	322	**-14**	441	**24**	339	**-5**	330	**-44**	324	**55**	340	**-29**	338
KRISS	**47**	115	**14**	323	**53**	158	**23**	137	**-16**	122	**83**	158	**0**	155
MSL	**95**	39	**63**	305	**101**	115	**72**	85	**33**	57	**132**	116	**48**	112
NIM	**11**	124	**-21**	327	**17**	165	**-12**	145	**-51**	131	**48**	165	**-36**	162
NIST	**-62**	69	**-95**	310	**-56**	129	**-86**	102	**-125**	80	**-26**	129	**-109**	125
NMIJ	**32**	304			**39**	323	**9**	313	**-30**	307	**69**	323	**-15**	321
NMi-VSL	**-6**	113	**-39**	323			**-30**	136	**-69**	120	**30**	157	**-53**	154
NPL	**23**	81	**-9**	313	**30**	136			**-39**	91	**60**	136	**-24**	132
NRC	**62**	52	**30**	307	**69**	120	**39**	91			**99**	120	**16**	116
PTB	**-37**	113	**-69**	323	**-30**	157	**-60**	136	**-99**	120			**-83**	154
SMU	**47**	109	**15**	321	**53**	154	**24**	132	**-16**	116	**83**	154		
A*STAR	**11**	144	**-21**	335	**18**	180	**-12**	162	**-51**	150	**48**	180	**-35**	178
UME	**-75**	183	**-107**	353	**-68**	213	**-98**	198	**-137**	187	**-38**	213	**-122**	211
VNIIM	**0**	94	**-32**	316	**7**	143	**-23**	120	**-62**	102	**37**	144	**-47**	140

Key comparison CCT-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence (Cont.)

Lab *j* ⟹

Lab *i* ⇩	D_i / µK	U_i / µK	**A*STAR** D_{ij} / µK	**A*STAR** U_{ij} / µK	**UME** D_{ij} / µK	**UME** U_{ij} / µK	**VNIIM** D_{ij} / µK	**VNIIM** U_{ij} / µK
BIPM	**-22**	90	**-34**	167	**53**	202	**-22**	126
LNE-INM	**-76**	134	**-87**	194	**-1**	225	**-76**	161
CEM	**-36**	85	**-47**	164	**39**	199	**-36**	123
CENAM	**-27**	58	**-38**	152	**48**	189	**-27**	106
NMISA	**83**	150	**72**	205	**158**	234	**83**	174
NMIA	**-51**	72	**-63**	158	**24**	194	**-51**	114
INRIM	**-37**	58	**-48**	152	**38**	189	**-37**	106
IPQ	**18**	322	**7**	351	**93**	369	**18**	334
KRISS	**47**	115	**35**	181	**121**	214	**47**	145
MSL	**95**	39	**84**	146	**170**	184	**95**	97
NIM	**11**	124	**0**	187	**86**	219	**11**	153
NIST	**-62**	69	**-74**	156	**12**	193	**-62**	112
NMIJ	**32**	304	**21**	335	**107**	353	**32**	316
NMi-VSL	**-6**	113	**-18**	180	**68**	213	**-7**	143
NPL	**23**	81	**12**	162	**98**	198	**23**	120
NRC	**62**	52	**51**	150	**137**	187	**62**	102
PTB	**-37**	113	**-48**	180	**38**	213	**-37**	144
SMU	**47**	109	**35**	178	**122**	211	**47**	140
A*STAR	**11**	144			**86**	231	**11**	169
UME	**-75**	183	**-86**	231			**-75**	203
VNIIM	**0**	94	**-11**	169	**75**	203		

Key comparison EURAMET.T-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence

Lab *j* ⟹

Lab *i* ⇩			CEM		INM(RO)		MKEH		INRIM		EIM		MIKES	
	D_i / µK	U_i / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK
CEM	**100**	98			**54**	146	**129**	155	**49**	98	**6**	240	**68**	152
INM(RO)	**46**	136	**-54**	146			**74**	176	**-5**	136	**-48**	257	**14**	178
MKEH	**-28**	145	**-129**	155	**-74**	176			**-79**	145	**-123**	262	**-61**	186
INRIM	**51**	73	**-49**	98	**5**	136	**79**	145			**-44**	228	**18**	132
EIM	**95**	230	**-6**	240	**48**	257	**123**	262	**44**	228			**62**	254
MIKES	**33**	137	**-68**	152	**-14**	178	**61**	186	**-18**	132	**-62**	254		
PTB	**88**	86	**-12**	108	**42**	143	**117**	152	**37**	78	**-6**	231	**56**	137
LNE-INM	**65**	120	**-35**	137	**19**	166	**93**	174	**14**	120	**-30**	250	**32**	167
DTI	**-2**	145	**-102**	159	**-48**	184	**26**	191	**-53**	145	**-97**	239	**-35**	185
JV	**-97**	390	**-197**	405	**-143**	416	**-69**	419	**-148**	400	**-192**	456	**-130**	416
VNIIM	**112**	113	**12**	130	**66**	161	**141**	169	**61**	113	**18**	246	**80**	148
MIRS/FE-LMK	**82**	68	**-18**	94	**36**	133	**110**	142	**31**	68	**-12**	229	**50**	134
DZM/LPM	**59**	110	**-42**	128	**13**	159	**87**	167	**8**	110	**-36**	245	**26**	160
UME	**-37**	161	**-137**	173	**-83**	197	**-8**	204	**-88**	161	**-131**	271	**-69**	198
DMDM	**-101**	242	**-201**	251	**-147**	268	**-73**	273	**-152**	242	**-196**	326	**-134**	269
SMD	**94**	82	**-7**	105	**47**	141	**122**	150	**43**	82	**-1**	233	**61**	142
BEV	**29**	352	**-72**	357	**-17**	369	**57**	372	**-22**	351	**-66**	413	**-4**	369
IPQ	**79**	166	**-22**	178	**33**	202	**107**	208	**28**	166	**-16**	275	**46**	202
NML(IE)	**89**	212	**-11**	226	**43**	248	**117**	250	**38**	217	**-6**	308	**56**	246
SMU	**45**	124	**-55**	140	**-1**	169	**74**	176	**-6**	124	**-49**	251	**13**	170
CMI	**-261**	130	**-361**	146	**-307**	173	**-233**	181	**-312**	130	**-356**	255	**-294**	174
GUM	**-260**	155	**-360**	170	**-306**	194	**-231**	201	**-311**	157	**-354**	269	**-292**	195
VMT/PFI	**-13**	243	**-114**	251	**-59**	268	**15**	273	**-64**	243	**-108**	327	**-46**	269
NMi-VSL	**63**	72	**-37**	96	**17**	135	**91**	144	**12**	71	**-32**	230	**30**	136

Key comparison EURAMET.T-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence (Cont.)

Lab *j* ⟹

Lab *i* ⇩	D_i / µK	U_i / µK	PTB D_{ij} / µK	PTB U_{ij} / µK	LNE-INM D_{ij} / µK	LNE-INM U_{ij} / µK	DTI D_{ij} / µK	DTI U_{ij} / µK	JV D_{ij} / µK	JV U_{ij} / µK	VNIIM D_{ij} / µK	VNIIM U_{ij} / µK	MIRS/FE-LMK D_{ij} / µK	MIRS/FE-LMK U_{ij} / µK
CEM	**100**	98	**12**	108	**35**	137	**102**	159	**197**	405	**-12**	130	**18**	94
INM(RO)	**46**	136	**-42**	143	**-19**	166	**48**	184	**143**	416	**-66**	161	**-36**	133
MKEH	**-28**	145	**-117**	152	**-93**	174	**-26**	191	**69**	419	**-141**	169	**-110**	142
INRIM	**51**	73	**-37**	78	**-14**	120	**53**	145	**148**	400	**-61**	113	**-31**	68
EIM	**95**	230	**6**	231	**30**	250	**97**	239	**192**	456	**-18**	246	**12**	229
MIKES	**33**	137	**-56**	137	**-33**	167	**35**	185	**129**	416	**-80**	148	**-50**	134
PTB	**88**	86			**23**	128	**90**	151	**185**	402	**-24**	116	**6**	81
LNE-INM	**65**	120	**-23**	128			**67**	170	**162**	409	**-47**	144	**-17**	117
DTI	**-2**	145	**-90**	151	**-67**	170			**-228**	412	**-19**	151	**-49**	142
JV	**-97**	390	**-185**	402	**-162**	409	**228**	412			**-209**	402	**-179**	399
VNIIM	**112**	113	**24**	116	**47**	144	**19**	151	**209**	402			**30**	110
MIRS/FE-LMK	**82**	68	**-6**	81	**17**	117	**49**	142	**179**	399	**-30**	110		
DZM/LPM	**59**	110	**-30**	119	**-6**	146	**73**	166	**156**	406	**-54**	140	**-23**	100
UME	**-37**	161	**-125**	167	**-102**	187	**168**	203	**60**	424	**-149**	182	**-119**	154
DMDM	**-101**	242	**-190**	247	**-167**	261	**233**	273	**-5**	462	**-214**	257	**-184**	238
SMD	**94**	82	**5**	93	**29**	126	**38**	149	**191**	401	**-19**	119	**11**	77
BEV	**29**	352	**-60**	353	**-36**	116	**103**	372	**126**	527	**-84**	361	**-53**	350
IPQ	**79**	166	**-10**	172	**14**	192	**53**	208	**176**	427	**-34**	187	**-3**	164
NML(IE)	**89**	212	**1**	221	**24**	237	**42**	250	**186**	449	**-23**	233	**7**	215
SMU	**45**	124	**-43**	132	**-20**	157	**86**	176	**142**	412	**-67**	151	**-37**	121
CMI	**-261**	130	**-349**	138	**-326**	162	**393**	181	**-164**	414	**-373**	156	**-343**	128
GUM	**-260**	155	**-348**	163	**-325**	184	**391**	201	**-163**	423	**-372**	179	**-342**	155
VMT/PFI	**-13**	243	**-102**	247	**-78**	261	**145**	273	**84**	462	**-126**	258	**-95**	241
NMi-VSL	**63**	72	**-25**	84	**-2**	119	**68**	144	**160**	397	**-49**	112	**-19**	66

Key comparison EURAMET.T-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence (Cont.)

Lab *j* ⟹

Lab *i* ⇩			DZM/LPM		UME		DMDM		SMD		BEV		IPQ	
	D_i / µK	U_i / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK
CEM	**100**	98	**42**	128	**137**	173	**202**	251	**7**	105	**72**	357	**22**	178
INM(RO)	**46**	136	**-13**	159	**83**	197	**148**	268	**-47**	141	**17**	369	**-33**	202
MKEH	**-28**	145	**-87**	167	**8**	204	**73**	273	**-122**	150	**-57**	372	**-107**	208
INRIM	**51**	73	**-8**	110	**88**	161	**152**	242	**-43**	82	**22**	351	**-28**	166
EIM	**95**	230	**36**	245	**131**	271	**196**	326	**1**	233	**66**	413	**16**	275
MIKES	**33**	137	**-26**	160	**69**	198	**134**	269	**-61**	142	**4**	369	**-46**	202
PTB	**88**	86	**30**	119	**125**	167	**190**	247	**-5**	93	**60**	353	**10**	172
LNE-INM	**65**	120	**6**	146	**102**	187	**167**	261	**-29**	126	**36**	116	**-14**	192
DTI	**-2**	145	**-73**	166	**-168**	203	**-233**	273	**-38**	149	**-103**	372	**-53**	208
JV	**-97**	390	**-156**	406	**-60**	424	**5**	462	**-191**	401	**-126**	527	**-176**	427
VNIIM	**112**	113	**54**	140	**149**	182	**214**	257	**19**	119	**84**	361	**34**	187
MIRS/FE-LMK	**82**	68	**23**	100	**119**	154	**184**	238	**-11**	77	**53**	350	**3**	164
DZM/LPM	**59**	110			**95**	175	**160**	252	**-35**	116	**30**	360	**-20**	185
UME	**-37**	161	**-95**	175			**65**	278	**-130**	165	**-65**	379	**-115**	219
DMDM	**-101**	242	**-160**	252	**-65**	278			**-195**	245	**-130**	420	**-180**	285
SMD	**94**	82	**35**	116	**130**	165	**195**	245			**65**	351	**15**	166
BEV	**29**	352	**-30**	360	**65**	379	**130**	420	**-65**	351			**-50**	379
IPQ	**79**	166	**20**	185	**115**	219	**180**	285	**-15**	166	**50**	379		
NML(IE)	**89**	212	**30**	232	**126**	260	**191**	317	**-4**	217	**60**	403	**10**	260
SMU	**45**	124	**-13**	149	**82**	189	**147**	262	**-48**	130	**17**	365	**-33**	194
CMI	**-261**	130	**-320**	154	**-224**	194	**-160**	265	**-355**	136	**-290**	365	**-340**	198
GUM	**-260**	155	**-318**	177	**-223**	212	**-158**	279	**-353**	161	**-288**	377	**-338**	217
VMT/PFI	**-13**	243	**-72**	256	**23**	282	**88**	335	**-107**	246	**-42**	420	**-92**	285
NMi-VSL	**63**	72	**4**	109	**100**	150	**165**	242	**-31**	80	**34**	350	**-16**	165

Key comparison EURAMET.T-K7

MEASURAND : Temperature of triple point of water
NOMINAL VALUE : 273.16 K

Matrix of equivalence (Cont.)

Lab *j* ⟹

Lab *i* ⇩			NML(IE)		SMU		CMI		GUM		VMT/PFI		NMi-VSL	
	D_i / µK	U_i / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK	D_{ij} / µK	U_{ij} / µK
CEM	**100**	98	**11**	226	**55**	140	**361**	146	**360**	170	**114**	251	**37**	96
INM(RO)	**46**	136	**-43**	248	**1**	169	**307**	173	**306**	194	**59**	268	**-17**	135
MKEH	**-28**	145	**-117**	250	**-74**	176	**233**	181	**231**	201	**-15**	273	**-91**	144
INRIM	**51**	73	**-38**	217	**6**	124	**312**	130	**311**	157	**64**	243	**-12**	71
EIM	**95**	230	**6**	308	**49**	251	**356**	255	**354**	269	**108**	327	**32**	230
MIKES	**33**	137	**-57**	246	**-13**	170	**294**	174	**292**	195	**46**	269	**-31**	136
PTB	**88**	86	**-1**	221	**43**	132	**349**	138	**348**	163	**102**	247	**25**	84
LNE-INM	**65**	120	**-24**	237	**20**	157	**326**	162	**325**	184	**78**	261	**2**	119
DTI	**-2**	145	**-42**	250	**-86**	176	**-393**	181	**-391**	201	**-145**	273	**-68**	144
JV	**-97**	390	**-186**	449	**-142**	412	**164**	414	**163**	423	**-84**	462	**-160**	397
VNIIM	**112**	113	**23**	233	**67**	151	**373**	156	**372**	179	**126**	258	**49**	112
MIRS/FE-LMK	**82**	68	**-7**	215	**37**	121	**343**	128	**342**	155	**95**	241	**19**	66
DZM/LPM	**59**	110	**-30**	232	**13**	149	**320**	154	**318**	177	**72**	256	**-4**	109
UME	**-37**	161	**-126**	260	**-82**	189	**224**	194	**223**	212	**-23**	282	**-100**	150
DMDM	**-101**	242	**-191**	317	**-147**	262	**160**	265	**158**	279	**-88**	335	**-165**	242
SMD	**94**	82	**4**	217	**48**	130	**355**	136	**353**	161	**107**	246	**31**	80
BEV	**29**	352	**-60**	403	**-17**	365	**290**	365	**288**	377	**42**	420	**-34**	350
IPQ	**79**	166	**-10**	260	**33**	194	**340**	198	**338**	217	**92**	285	**16**	165
NML(IE)	**89**	212			**44**	239	**350**	242	**349**	258	**102**	317	**26**	216
SMU	**45**	124	**-44**	239			**306**	161	**305**	183	**59**	260	**-18**	123
CMI	**-261**	130	**-350**	242	**-306**	161			**-1**	182	**-248**	260	**-324**	129
GUM	**-260**	155	**-349**	258	**-305**	183	**1**	182			**-246**	274	**-323**	156
VMT/PFI	**-13**	243	**-102**	317	**-59**	260	**248**	260	**246**	274			**-76**	242
NMi-VSL	**63**	72	**-26**	216	**18**	123	**324**	129	**323**	156	**76**	242		