CCL-GD4 Key comparison planning document

Version	Date	Comment
1.0	2009-07-13	Initial copy sent by RT to AL after CCL meeting and updates sent by S-L Tan
1.1	2009-09-01	Updated for latest info on APMP.L-K1.1, added NPL to EURAMET.L-K4.2004
1.2	2009-12-17	Added AU and JP to EURAMET.L-K3.2009
1.3	2010-02-02	Added EURAMET.L-K1.2
1.4	2010-04-27	Tidying up. Added EURAMET.L-K3.1
1.5	2010-05-21	INMETRO added as CCL member for SIM, latest KC info updated
1.6	2010-06-02	Minor edits post APMP report to WG-MRA, plus EURAMET.L-K3.1 is Final
1.7	2010-06-03	Minor edits post SIM report to WG-MRA
1.8	2010-06-28	Updates to participants of CCL-K1.2010
1.9	2011-09-07	Various updates prior to WG-MRA meeting 2011
1.10	2011-09-08	Change of status EURAMET.L-K5.2004.
1.11	2011-09-20	Updates to SIM KC
1.12	2011-09-30	APMP.L-K6 Final
1.13	2011-10-04	Updated after EURAMET TC-L meeting 2011, before WG-MRA meeting
1.14	2011-10-06	Updated during WG-MRA meeting 2011
1.15	2011-10-10	Added NPL to EURAMET.L-K6 list
1.16	2011-10-21	Added EURAMET K11 data and new K11-MeP sheet
1.17	2011-12-13	Added APMP.L-K1.1.2011, sim.L-K3 -> SIM.L-K3.2008
1.18	2012-02-10	Added EUROMET.L-K1.2011 final details
1.19	2012-04-13	Updated several comparisons
1.20_eurame	2012-08-28	All EURAMET TC-L member with CMCs added with their participation data; corrected CCL-S3 & EURAMET.L-S14 mix-up; added CMC column and calculation of years from last comparison for EURAMET TC-L members; some other smaller formulations /A. Lassila
1.201	2012-10-09	Added EUROMET.L-K4.2005 and EURAMET.L-K3.1 for Estonia, S11 participants corrected, GUM added to SIM.L-K3.2008, end year of EURAMET.L-k5 chandeg to 2007, updated CMCs from EURAMET.L.11.2012
1.202	2012-10-22	Added SMU to K3.2009
1.203	2012-11-8	Added DK to K4.2005
1.3	2013-10-03	Added EURAMET.L-K8.2013
1.31	2013-10-04	Added KC CMC from EURAMET.L.14.2013 (BG K3), checked EURAMET.L.13.2012 (no KC CMCs) and added KC CMCs from EURAMET.L.12.2012 (DFM K4); added EURAMET.L-K4.1.2013, Added UME for K11 2013
1.32.	2014-09-10	Name of follow-up EURAMET.L-K4 was updated to EURAMET.L-K4.2005.1; updated VSL stopped the surface roughness; BG CCL-K11 2014 partc. added
1.33	2015-10-25	Status update of various comparisons; cross check with CCL WG-MRA list
1.34	2016-10-15	Status update of various comparisons; cross check with CCL WG-MRA list
1.34	2016-10-15	Corrections coming from the WGMRA list (participant withdrawal, or addition)
1.35	2017-10-14	Status update of various comparisons; cross check with CCL WG-MRA list
1.36	2018-10-14	Status update of various comparisons; cross check with CCL WG-MRA list (v1.43)
1.45	2019-10-09	Status update and cross-check with CCL WGMRA v1.45
1.46	2019-11-99	Updates after the WG-MRA meeting including new KCDB links
1.47	2020-08-28	Updates: EURAMET.L-K5.2016
1.48	2020-10-08	Updates prior to WG-MRA meeting
1.49	2020-10-13	Updated after EURAMET TC-L meeting 2020. Added countries to EURAMET: HA (Bosniz & Herzegovina, IMBiH), MD (Moldova, INM-MD), ME (Montenegro, MBM), MK (N Macedonia, BoM)
1.50	2020-11-11	Updated KCDB2.0 links for comparisons, updated new comparisons.
1.51	2020-12-17	Post WG-MRA updates to participation
1.52	2021-02-02	Added APMP.L-K5.2021
1.53	2021-10-04	Updated prior to WG-MRA meeting
1.54	2021-10-18	Updated after WG-MRA and prior to CCL
1.55	2021-11-18	Updated after EURAMET TC-L meeting
1.56	2022-02-23	NMIJ accepted into APMP.L-K5, no longer in EURAMET.L-K5.n01
1.57	2022-09-23	SMU no longer have interferometric gauge block CMC, some updates, full SC list
1.58	2022-09-26	Full update prior to TC-L and WG-MRA meetings
1.59	2022-09-28	Added NIS (EG) as CCL member, further updates e.g. K11
1.60	2022-10-19	Updated after EURAMET TC-L meeting
1.61	2022-11-26	Updated after WG-MRA 2022 meeting. Del A*STAR from APMP.L-K5.2021; add NIST o to APMP.L-K8.2021

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years from start of last comparison
APMP																																								
AU (NMIA)	x					2					4			7				9														16							2
CN (NIM)	x										4			7				9					12									16		19					0
JP (NMIJ)	x										4			7				9					12	14								16							2
KR (KRISS)	x										4			7																		16							2
SG (A*STAR)	x													7				9					12									16		19					0
COOMET																																							
VNIIM	x										4																							19					0
EURAMET																																							
AT (BEV)	x											5												13										19					0
CH (METAS)	x		1			2					4	5											12	13								18							2
CZ (CMI, VÚGTK)	x		1									5			8					10					13							18		19					0
DE (PTB)	x		1									5			8								12									18							2
ES (CEM)	x		1					3			6	5								10				13								18	15		20				0
FI (MIKES, FGI)	x											5			8								12		13									19	20				0
FR (LNE, LNE-INM)	x		1								4	5												13										19					0
IT (INRIM)	x		1									5											12									18		19					0
NL (NMi VSL)	x		1									5												13										19					0
SK (SMU)						2						5												13															
TR (UME)	x														8										13									19	20				0
UK (NPL)	x		1								4	5												13										19	20				0
AL (DPM)																																							
BE (SMD)	x											5													13							18							2
BG (BIM)	x														8										13										20				0
DK (DANIAmet-DFM, DTU, DTI)	x		1									5										11				13									20				0
EE (Metrosert)																																							
GR (EIM)	x														8									13											20				0
HA (IMBiH)																																							
HR (HMI/FSB-LPMD)	2012																					11			13										20				0
HU (BFKH)	x											5										11													20				0
IE (NSAI NML)																																							
LT (VMT/VMC)																																							
LV (LATMB)																																							
MD (INM-MD)																																							
ME (MBM)																																							
MK (BoM)																																							
MT (MSA-NMS)																																							
NO (JV)	x											5			8										13										20				0
PL (GUM)	x														8							11			13										20				0
PT (IPQ)	x											5			8										13										20				0
RO (INM)	x														8										13								15						1
RS (DMDM)	x																								13								15						1
SE (RISE)	x		1									5												13											20				0
SI (MIRS/UM-FS/LTM)																																							
AFRIMETS																																							
EG (NIS)	x																					11			13										20				0
SA (NMISA)	x																								12								15	19					0
SIM																																							
BR (INMETRO)	x											6									10			12										19					0
CA (NRC)	x							3			4	6									10			12									15	19					0
MX (CENAM)	x							3			4	6								10				12							17								4
USA (NIST)	x					2		3			4	6									10			12										19					0

	start	stop	KCDB number & link	Status	Publication reference
1	1991	1992	EUROMET.L-K1.Prev		(Metrologia, 1995, 32, 79-86)
2	1993	1994	CCDM gauge block comparison		(Metrologia, 1998 35, 97)
3	1998	1999	SIM.L-K1.Prev.		(Metrologia, 1999, 36, 421-432)
4	1998	2000	CCL-K1		(Metrologia, 2002, 39, 165-177)
5	2002	2003	EUROMET.L-K1		(KCDB, EUROMET project #471 Final report)
6	2001	2002	SIM.L-K1		(Metrologia, 2007, 44, Tech. Suppl. 04001)
7	2005	2006	APMP.L-K1		(Metrologia, 2006, 43, Tech. Suppl. 04004)
8	1994	1996	EUROMET.L-K1.1		(KCDB, EUROMET project #471 Final report)
9	1998	2000	APMP.L-K1.1		(Metrologia, 2009, 46, Tech. Suppl. 04005)
10	2008	2010	SIM.L-K1.2007		(Metrologia, 2012, 49, Tech. Suppl. 04010)
11	2010	2010	EURAMET.L-K1.2		(Metrologia, 2012, 49, Tech. Suppl. 04005)
12	2011	2013	CCL-K1.2011		(Metrologia, 2022, 59, Tech. Suppl. 04005)
13	2012	2014	EURAMET.L-K1.2011		(Metrologia, 2016, 53, Tech. Suppl. 04003)
14	2011	2012	APMP.L-K1.1.2011		(Metrologia, 2013, 50, Tech. Suppl. 04002)
15	2021	2022	AFRIMETS.L-K1.2020	Running	
16	2020	2022	APMP.L-K1.2018	Running	
17	2018	2019	SIM.L-K1.2007.1		(Metrologia, 2021, 58, Tech. Suppl. 04002)
18	2020	2020	EURAMET.L-K1.2019		(Metrologia, 2022, 59, Tech. Suppl. 04002)
19	2022		CCL-K1.n01	Planning	
20	2022		EURAMET.L-K1.n01	Planning	

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
APMP																			
AU (NMIA)	x												2	4					
CN (NIM)	x												2	4					
JP (NMIJ)	x													4					
KR (KRISS)	x													4					
SG (A*STAR)	x													4					
COOMET																			
VNIIM	x												2						
EURAMET																			
AT (BEV)	x																3		
CH (METAS)	x						1										3		
CZ (CMI)	x																3		
DE (PTB)	x						1						2				3		
ES (CEM)	x						1										3		
FI (MIKES)	x						1										3		
FR (LNE)	x																3		
IT (INRIM)	x						1						2				3		
NL (NMi VSL)	x						1										3		
SK (SMU)	x																3		
TR (UME)	x																3		
UK (NPL)	x						1						2				3		
AL (DPM)																			
BE (SMD)																			
BG (BIM)																			
DK (DANIAmet-DFM, DTU, DTI)																			
EE (Metrosert)																			
GR (EIM)																			
HA (IMBiH)																			
HR (HMI/FSB-LPMD)																			
HU (BFKH)																			
IE (NSAI NML)																			
LT (VMT/VMC)																			
LV (LATMB)																			
MD (INM-MD)																			
ME (MBM)																			
MK (BoM)																			
MT (MSA-NMS)																			
NO (JV)																			
PL (GUM)																			
PT (IPQ)																			
RO (INM)																			
RS (DMDM)																			
SE (RISE)																			
SI (MIRS/UM-FS/LTM)																			
AFRIMETS																			
EG (NIS)	x																		
SA (NMISA)	x												2						
SIM																			
BR (INMETRO)	x																		
CA (NRC)	x												2						
MX (CENAM)	x																		
USA (NIST)	x												2						

CCL-K2 long gauges joined with CCL-K1 for future comaprisons, limited to L <= 500 mm

	start	stop	KCDB number & link	Status	Publication reference
1	1993	1995	EUROMET.L-K2.Prev		(Metrologia, 1996, 33, 485-491)
2	1999	2001	CCL-K2		(Metrologia, 2003, 40, Tech. Suppl. 04004)
3	2002	2005	EUROMET.L-K2		(Metrologia, 2006, 43, Tech. Suppl. 04003)
4	2000	2002	APMP.L-K2		(Metrologia, 2006, 43, Tech. Suppl. 04005)

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years from start of last comparison
APMP																																								
AU (NMIA)	x																		3						7								13						1
CN (NIM)	x													2					3						7								15						1
JP (NMIJ)	x													2					3						7								15						1
KR (KRISS)	x													2					3														15						1
SG (A*STAR)	x																		3				6				8						15						1
COOMET																																							
VNIIM	x													2										10			8												8
EURAMET																																							
AT (BEV)																																							
CH (METAS)	x										1			2								5						12											5
CZ (CMI, VÚGTK)	x										1												6		7		8					13						1
DE (PTB)	x										1			2								5	6			8	8	8	12									5
ES (CEM)	x										1													6								15						1
FI (MIKES, FGI)	x										1											5										13						1
FR (LNE, LNE-INM)	x										1			2								5				11						13						1
IT (INRIM)	x										1			2						9		5		6								15						1
NL (NMi VSL)	x										1											5		6								13						1
SK (SMU)	x										1			2									6				8												8
TR (UME)	x										1											5										15						1
UK (NPL)	x										1											5											13						1
AL (DPM)																																							
BE (SMD)																																							
BG (BIM)	2013																							6			8					13						1
DK (DANIAmet-DFM, DTU, DTI)																																							
EE (Metrosert)																				9																		
GR (EIM)																								6								13						
HA (IMBiH)																																							
HR (HMI/FSB-LPMD)																																							
HU (BFKH)																							6															
IE (NSAI NML)																																							
LT (VMT/VMC)																																							
LV (LATMB)																				9																		
MD (INM-MD)																																							
ME (MBM)																																							
MK (BoM)																																							
MT (MSA-NMS)																																							
NO (JV)																																							
PL (GUM)	x										1											4	6									13						1
PT (IPQ)	x																			9				6								13						1
RO (INM)	x																					5																	**12**
RS (DMDM)	x																									8							13						1
SE (RISE)																																							
SI (MIRS/UM-FS/LTM)																																							
AFRIMETS																																							
EG (NIS)																																							
SA (NMISA)	x													2					3														15						1
SIM																																							
BR (INMETRO)	x																					4										14	15						1
CA (NRC)														2																		14	15						
MX (CENAM)	x													2								4										14	15						1
USA (NIST)	x													2								4										14							3

	start	stop	KCDB number & link	Status	Publication reference	
1	1996	1999	EUROMET.L-K3.Prev		(EUROMET Project 371, PTB-report F-43, 2001)	
2	2000	2002	CCL-K3		(Metrologia, 2009, 46, Tech. Suppl. 04004)	
3	2005	2007	APMP.L-K3		(Metrologia, 2016, 53, Tech. Suppl. 04006)	
4	2008	2010	SIM.L-K3.2008		(Metrologia, 2015, 52, Tech. Suppl. 04008)	
5 Loop 1	2010	2010				
6 Loop 2	2011	2012				
7 Loop 3	2013	2013	EURAMET.L-K3.2009		(Metrologia, 2018, 55, Tech. Suppl. 04001)	Note: this comparison ran in 4 loops over long timescale
8 Loop 4	2014	2016				
9	2008	2008	EURAMET.L-K3.1		(Metrologia, 2010, 47, Tech. Suppl. 04005)	
10	2011	2012	COOMET.L-K3	Draft B under review in WG-MRA		
11	2014	2014	EURAMET.L-K3.2009.1		(Metrologia, 2015, 52, Tech. Suppl. 04011)	
12	2017	2017	EURAMET.L-K3.2009.2		(Metrologia, 2018, 55, Tech. Suppl., 04005)	
13	2021	2022	EURAMET.L-K3.n01	Running		
14	2019	2021	SIM.L-K3.2019	Final to be sent to KCDB		
15	2021		CCL-K3.2020	Running		

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years from start of last comparison
APMP																																								
AU (NMIA)	x													2						4														11					1
CN (NIM)	x													2													8											7
JP (NMIJ)																				4																			
KR (KRISS)	x													2						4														11					1
SG (A*STAR)	x																			4														11					1
COOMET																																							
VNIIM	x													2													8				10							2
EURAMET																																							
AT (BEV)	x																		3								9											6
CH (METAS)	x									1				2					3								8		9									6
CZ (CMI, VÚGTK)	x									1									3										9									6
DE (PTB)	x									1				2					3										9									6
ES (CEM)	x																		3								8		9									6
FI (MIKES, FGI)	x									1									3										9									6
FR (LNE, LNE-INM)	x									1									3										9									6
IT (INRIM)	x									1				2					3						7		8		9									6
NL (NMi VSL)	x									1									3						7				9									6
SK (SMU)																																							
TR (UME)	x									1									3										9									6
UK (NPL)	x									1				2					3							7													9
AL (DPM)																																							
BE (SMD)	x																		3							7													9
BG (BIM)																																							
DK (DANIAmet-DFM, DTU, DTI)	2012																		3										9									6
EE (Metrosert)																			3																			
GR (EIM)																			3										9									
HA (IBMiH)																																							
HR (HMI/FSB-LPMD)	x																		3										9									6
HU (BFKH)	x									1									3										9									6
IE (NSAI NML)	2012																		3										9									6
LT (VMT/VMC)																																							
LV (LATMB)																			3																			
MD (INM-MD)																																							
ME (MBM)																													9										
MK (BoM)																																							
MT (MSA-NMS)																																							
NO (JV)																																							
PL (GUM)	x									1									3										9									6
PT (IPQ)																																							
RO (INM)	x																		3	5									9									6
RS (DMDM)																																							
SE (RISE)	x									1									3										9									6
SI (MIRS/UM-FS/LTM)	x																		3							7												9
AFRIMETS																																							
EG (NIS)																																							
SA (NMISA)	x													2															8					11					1
SIM																																							
BR (INMETRO)	x																		3		6							8										7
CA (NRC)																			3								8											
MX (CENAM)	x													2							6							8										7
USA (NIST)	x													2							6							8										7

	start	stop	KCDB number & link	Status	Publication reference	
1	1996	1998	EUROMET.L-K4.Prev		(Metrologia, 2000, 37, 253-260)	
2	2000	2002	CCL-K4a CCL-K4b		(KCDB)	
3	2005	2007	EUROMET.L-K4.2005		(Metrologia, 2010, 47, Tech. Suppl. 04001),	(Metrologia, 2010, 47, Tech. Suppl. 04003)
4	2008	2010	APMP.L-K4		(Metrologia, 2014, 51, Tech. Suppl. 04004)	
5	2006	2008	COOMET.L-K4.b		Abandoned	
6	2009	2010	SIM.L-K4.2009		(Metrologia, 2015, 52, Tech. Suppl. 04004)	
7	2013	2014	EURAMET.L-K4.2005.1		(Metrologia, 2020, 57, Tech. Suppl. 04003)	
8	2015	2017	CCL.K4.2015	Draft B with participants		
9	2016	2018	EURAMET.L-K4.2015		(Metrologia 2021 58 Tech. Suppl. 04004)	
10	2020	2021	COOMET.L-K4.2021	Draft A with participants		
11	2021	2023	APMP.L-K4.n01	Running		

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years from start of last comparison
APMP																																								
AU (NMIA)	x													2				3	4															8					1
CN (NIM)	x													2					4											6				8					1
JP (NMIJ)	x													2					4					5				6					8					1
KR (KRISS)	x													2					4														8					1
SG (A*STAR)																														6									
COOMET																																							
VNIIM																		3																					
EURAMET																																							
AT (BEV)	x																	3									6												6
CH (METAS)	x									1				2					4										6										6
CZ (CMI, VÚGTK)	x																	3										6										6
DE (PTB)										1				2																									
ES (CEM)	x									1				2				3										6							9				0
FI (MIKES, FGI)	x																	3											6									6
FR (LNE, LNE-INM)	x																	3									6							9				0
IT (INRIM)	x									1								3											6									6
NL (NMi VSL)	x									1								3											6						9			0
SK (SMU)																																							
TR (UME)																												6					8					
UK (NPL)	x									1								3									6												6
AL (DPM)																																							
BE (SMD)																																							
BG (BIM)																																							
DK (DANIAmet-DFM, DTU, DTI)																																							
EE (Metrosert)																																							
GR (EIM)																																							
HA (IMBiH)																																							
HR (HMI/FSB-LPMD)																																							
HU (BFKH)	x																	3										6						9				0
IE (NSAI NML)																		3																					
LT (VMT/VMC)																																							
LV (LATMB)																																							
MD (INM-MD)																																							
ME (MBM)																																							
MK (BoM)																																							
MT (MSA-NMS)																																							
NO (JV)																																							
PL (GUM)	x																	3											6					9				0
PT (IPQ)																																							
RO (INM)	x																	3										6										6
RS (DMDM)																																							
SE (RISE)	x									1								3									6												6
SI (MIRS/UM-FS/LTM)																																							
AFRIMETS																																							
EG (NIS)																																							
SA (NMISA)	x																	3										6										6
SIM																																							
BR (INMETRO)	x																	3	4															9					0
CA (NRC)																		3												6									
MX (CENAM)	x													2				3												6									6
USA (NIST)	x													2					4									6											6

	start	stop	KCDB number & link	Status	Publication reference
1	1996	1998	EUROMET.L-K5.Prev		(PTB Report F-37, September 1999)
2	1999	2002	CCL-K5		(Metrologia, 2006, 43, Tech. Suppl. 04006)
3	2004	2007	EUROMET.L-K5.2004		(Metrologia, 2012, 49, Tech. Suppl. 04008)
4	2006	2007	APMP.L-K5.2006		(Metrologia, 2012, 49, Tech. Suppl. 04007)
5	2012	2012	APMP.L-K5.2006.1		(Metrologia, 2017, 54, Tech. Suppl. 05006)
6	2016	2017	EURAMET.L-K5.2016		(Metrologua 2020, 57, Tech. Suppl. 04002)
7	2014	2015	APMP.L-K5.2014		Abandoned
8	2021	2022	APMP.L-K5.2021	Running	
9	2022	2023	EURAMET.L-K5.n01	Starting	

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
APMP																					
AU (NMIA)	x							1							2					4	
CN (NIM)	x														2					4	
JP (NMIJ)	x														2					4	
KR (KRISS)	x																			4	
SG (A*STAR)																					
COOMET																					
VNIIM															2						
EURAMET																					
AT (BEV)	x																				
CH (METAS)	x																3				
CZ (CMI)	x							1							2		3				
DE (PTB)								1							2		3				
ES (CEM)	x																				
FI (MIKES)	x																3			4	
FR (LNE)	x														2						
IT (INRIM)	x																			4	
NL (NMi VSL)	x														2		3				
SK (SMU)																					
TR (UME)																					
UK (NPL)	x														2		3				
AL (DPM)																					
BE (SMD)																					
BG (BIM)																					
DK (DANIAmet-DFM, DTU, DTI)																					
EE (Metrosert)																					
GR (EIM)																					
HA (IMBiH)																					
HR (HMI/FSB-LPMD)																					
HU (BFKH)																					
IE (NSAI NML)																					
LT (VMT/VMC)																					
LV (LATMB)																					
MD (INM-MD)																					
ME (MBM)																					
MK (BoM)																					
MT (MSA-NMS)																					
NO (JV)																					
PL (GUM)																					
PT (IPQ)																					
RO (INM)																					
RS (DMDM)																					
SE (RISE)																					
SI (MIRS/UM-FS/LTM)																					
AFRIMETS																					
EG (NIS)																					
SA (NMISA)	x							1												4	
SIM																					
BR (INMETRO)	x																			4	
CA (NRC)								1							2					4	
MX (CENAM)	x														2						
USA (NIST)	x														2						

CCL-K6 comparison series halted. DG6 discussing new artefacts and comparisons

	start	stop	KCDB number & link	Status	Publication reference
2	2000	2003	CCL-K6		(Metrologia, 2009, 46, Tech. Suppl. 04003)
3	2004	2005	EUROMET.L-K6		(Metrologia, 2013, 50, Tech. Suppl. 04001)
1	1996	1996	SIM.L-K6.Prev.		(Proc. International Dimensional Workshop on "Metrology of the 21st Century", May 1999)
4	2008	2008	APMP.L-K6		(Metrologia, 2014, 51, Tech. Suppl. 04003)
5	2022	2024	APMP.L-S10	Being planned as supplementary comparison	

(K6-ball plate)

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years from start of last comparison
APMP																																								
AU (NMIA)	x													2		3			4								5													7
CN (NIM)	x															3			4									5							8				8	1
JP (NMIJ)	x															3											5													7
KR (KRISS)	x																										5													7
SG (A*STAR)	x																		4								5													7
COOMET																																								
VNIIM	x															3				4													8							1
EURAMET																																								
AT (BEV)	x													2				4																	8					1
CH (METAS)	x				1									2		3				4													8							1
CZ (CMI, VÚGTK)	x													2						4														8						1
DE (PTB)	x				1									2		3			4														8							1
ES (CEM)	x													2					4														8							1
FI (MIKES, FGI)	x				1									2		3			4														8							1
FR (LNE, LNE-INM)	x				1											3										6		5					8							1
IT (INRIM)	x				1											3		4										7												6
NL (NMi VSL)	x				1														4														8							1
SK (SMU)	x																	4															8							1
TR (UME)																																	8							
UK (NPL)	x				1															4														8						1
AL (DPM)																																								
BE (SMD)																3																								
BG (BIM)	x															3			4															8						1
DK (DANIAmet-DFM, DTU, DTI)																																								
EE (Metrosert)																																								
GR (EIM)																		4																							
HA (IMBiH)																																								
HR (HMI/FSB-LPMD)	x																		4															8						1
HU (BFKH)	x															3		4																	8					1
IE (NSAI NML)	2012																		4														8							1
LT (VMT/VMC)																																								
LV (LATMB)	x															3			4														8							1
MD (INM-MD)																																								
ME (MBM)																																								
MK (BoM)																																								
MT (MSA-NMS)																																								
NO (JV)																3																								
PL (GUM)	x															3			4															8						1
PT (IPQ)																																								
RO (INM)	x															3			4																8					1
RS (DMDM)																			4																					
SE (RISE)	x													2		3											5													7
SI (MIRS/UM-FS/LTM)	x															3		4																8						1
AFRIMETS																																								
EG (NIS)																																								
SA (NMISA)	x																										5													7
SIM																																								
BR (INMETRO)																			4									5												
CA (NRC)																				4																				
MX (CENAM)	x																		4																				8		1
USA (NIST)	x															3			4														8							1

	start	stop	KCDB number & link	Status	Publication reference
1	1992	1993	EUROMET.L-S1		(EUROMET Project 252, Final report, BNM-LNE Report, September 1995)
2	2003	2004	EUROMET.L-S14		(Metrologia, 2003, 40, Tech. Suppl. 04002)
3	2000	2002	CCL-S3		(EUROMET.L-S14 Final Report, 2004, 38 pages)
4	2006	2008	EUROMET.L-K7.2006		(Metrologia, 2012, 49, Tech. Suppl. 04006)
5	2015	2016	APMP.L-K7		Met Tech. Supp MISSING
6	2014	2014	EURAMET.L-K7.2014		(Metrologia, 2015, 52, Tech. Suppl. 04007)
7	2016	2017	SIM.L-K7.2016	Draft B with participants	
8	2021		EURAMET.L-K7.n01	Draft Protocol (PTB pilot)	

	CMC X/since	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years from start of last comparison
APMP																																							
AU (NMIA)	x																			3												6	7						1
CN (NIM)	x																				3												6	7					1
JP (NMIJ)	x																				3												7						1
KR (KRISS)	x																				3												7						1
SG (A*STAR)	x																			3						5								7					1
COOMET																																							
VNIIM	x																															6			7				2
EURAMET																																							
AT (BEV)	x																								5							6							2
CH (METAS)	x													2											5							6							2
CZ (CMI, VÚGTK)	x													2								4										6							2
DE (PTB)	x													2						3												6							2
ES (CEM)	x													2											5								6						2
FI (MIKES, FGI)	x													2											5														9
FR (LNE, LNE-INM)	x																						4		5														9
IT (INRIM)	x													2									4		5														9
NL (NMi VSL)														2																									
SK (SMU)														2																									
TR (UME)	x													2												5														9
UK (NPL)	x													2						3			4										6		7				2
AL (DPM)																																							
BE (SMD)																																							
BG (BIM)																																							
DK (DANIAmet-DFM, DTU, DTI)	x													2											5														9
EE (Metrosert)	x																					4																	**13**
GR (EIM)																																							
HA (IMBiH)																																							
HR (HMI/FSB-LPMD)	x																					4										6							2
HU (BFKH)																																							
IE (NSAI NML)																																							
LT (VMT/VMC)														2																									
LV (LATMB)																																							
MD (INM-MD)																																							
ME (MBM)																																							
MK (BoM)																																							
MT (MSA-NMS)																																							
NO (JV)																																							
PL (GUM)	x													2											5							6							2
PT (IPQ)	x													2											5														9
RO (INM)	x																					4										6							2
RS (DMDM)																										5													
SE (RISE)	x													2											5														9
SI (MIRS/UM-FS/LTM)																																							
AFRIMETS																																							
EG (NIS)	x																				3		4																**13**
SA (NMISA)	x																				3					5													9
SIM																																							
BR (INMETRO)	x												1								4					5													9
CA (NRC)													1																										
MX (CENAM)	x												1								4													7					1
USA (NIST)	x												1								3	4													7				**13**

DFM had unsuccessful participation in 6

	start	stop	KCDB number & link	Status	Publication reference
1	2000	2001	SIM.L-S2		(Metrologia, 2006, 43, Tech. Suppl. 04002)
2	2001	2002	EUROMET.L-S11		(Metrologia, 2004, 41, Tech. Suppl. 04001)
3	2008	2010	APMP.L-K8		(Metrologia, 2013, 50, Tech. Suppl. 04003)
4	2009	2011	EURAMET.L-K8		(Metrologia, 2017, 54, Tech. Suppl. 04005)
5	2013	2015	EURAMET.L-K8.2013		(Metrologia, 2015, 53, Tech. Suppl. 04001)
6	2020	2020	EURAMET.L-K8.2020	Running	
7	2021	2022	APMP.L-K8.2021	Running	

	CMC x/since YYYY	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Years from last comparison
APMP																																								
AU (NMIA)																																R							
CN (NIM)	x																					4										R							**12**
JP (NMIJ)	x																					4										R							Node
KR (KRISS)	x																															R							
SG (A*STAR)	x																					4										R							**12**
COOMET																																							
VNIIM	x																															R							
EURAMET																																							
AT (BEV)	x										0		1								3										14							2
CH (METAS)	x		0				0															4											15						1
CZ (CMI, VÚGTK)	x					0				0	0				1								4										15						1
DE (PTB)			0				0					0																											
ES (CEM)	x					0	0						1					2					5																**11**
FI (MIKES, FGI)	x				0				0	0					1				3																			Node
FR (LNE, LNE-INM, CNAM)	x			0			0								1	2		2																16				0
IT (INRIM)	x						0						1			2		2																					**16**
NL (NMi VSL)	x						0								1	2										9												7
SK (SMU)	x					0											2					4										R		16					0
TR (UME)	x					0									1		2	2			3				7				11									5
UK (NPL)	x						0						1												7													Node
AL (DPM)																																							
BE (SMD)	x		0				0																		7													9
BG (BIM)	x						0						1													8												8
DK (DANIAmet-DFM, DTU, DTI)			0		0												2																					
EE (Metrosert)																																							
GR (EIM)	x																2													13								3
HA (IMBiH)																																							
HR (HMI/FSB-LPMD)	x																				3																	**13**
HU (BFKH)	x					0					0											4										14							2
IE (NSAI NML)																																							
LT (VMT/VMC)																																							
LV (LATMB)																																							
MD (INM-MD)																																							
ME (MBM)																																							
MK (BoM)																																							
MT (MSA-NMS)																																							
NO (JV)	x						0				0			1										6															**10**
PL (GUM)	x										0				1				3							9												7
PT (IPQ)	x				0	0										2		2									10											6
RO (INM)	x																2										9											6
RS (DMDM)	x	0																					5										15						1
SE (RISE)	x	0	0		0											2		2						6															**10**
SI (MIRS/UM-FS/LTM)	x																				3									12									4
AFRIMETS																																							
EG (NIS)	x															2		2					5																**11**
SA (NMISA)	x																							6						12									4
SIM																																							
BR (INMETRO)	x																				3																	**13**
CA (NRC)	x																				3																	Node
MX (CENAM)	x																				3											R						**13**
USA (NIST)	x																							6														**10**

	start	stop	KCDB number & link	Status	Publication reference				
0	1991		BIPM.L-K10		Phys. Rev. Lett., 2000, 85, 18, 3797-3800	Appl. Phys. B, 2001, 72, 221-226	Proc. SPIE, 2001, 4269, 122-133		
1	2000	2003	Calibration at BIPM						
2	2004	2006	BIPM.L-K11		(Metrologia, 2005, 42, Tech. Suppl, 04002)	(Metrologia, 2005, 42, Tech. Suppl. 04003)	(Metrologia, 2	(Metrologia, 2005, 42, Tech. Suppl. 04004)	Metrologia, 2007, 44, Tech. Suppl., 04003	Metrologia, 2007, 44, Tech. Suppl., 04004
3	2007	2009	CCL-K11	Report for 2007 - 2009	(Metrologia, 2010, 47, Tech. Suppl, 04009)				
4	2010	2010		Report for 2010	(Metrologia, 2011, 48, Tech. Suppl, 04001)				
5	2011	2011		Report for 2011	(Metrologia, 2012, 49, Tech. Suppl, 04009)				
6	2012	2012		Report for 2012	(Metrologia, 2015, 52, Tech. Suppl, 04005)				
7	2013	2013		Report for 2013	(Metrologia, 2015, 52, Tech. Suppl, 04006)				
8	2014	2014		Report for 2014	(Metrologia, 2016, 53, Tech. Suppl, 04007)				
9	2015	2015		Report for 2015	(Metrologia, 2017, 54, Tech. Suppl, 04001)				
10	2016	2016		Report for 2016	(Metrologia, 2018, 55, Tech. Suppl, 04003)				
11	2017	2017		Report for 2017	(Metrologia, 2018, 55, Tech. Suppl, 04004)				
12	2018	2018							
13	2019	2019		Report for 2018 - 2020	(Metrologia, 2022, 59, Tech. Suppl, 04001)	R = requested but postponed due to COVID			
14	2020	2020							
15	2021	2021		Report for 2021	(Metrologia, 2022, 59, Tech. Suppl, 04004)				
16	2022	2022							
17	2023	2023							

APMP.L-K11 ITRI, MSL, NIM, NIMT, NMIJ, NMISA, SIRIM, SCL 2004

PTB offers CMCs but take a different approach to K11 equivalancy (see WGMRA-19-5.9-3_CCL-K11_TechnicalProtocol_v2.96.docx)

CCL members in bold

CCL observers in BOLD Italics

AFRIMETS		APMP		COOMET		GULFMET		SIM		EURAMET	
Botswana	BOBS	**Australia**	**NMIA**	Azerbaijan	AZSTAND	Kuwait	PAI	**Canada**	**NRC**	Albania	DPM
Mauritius	MSB	Bangladesh	NML-BSTI	Belarus	BELGIM	Oman	DGSM	**Mexico**	**CENAM**	**Austria**	**BEV**
Namibia	NSI			Cuba	NC	Qatar	QGOSM	**USA**	**NIST**	Belgium	SMD
Seychelles	SBS	**China**	**NIM**	Georgia	GEOSTM	Saudi Arabia	SASO	**USA**	**JILA**	Bosnia and Herzegovina	IMBIH
South Africa	**NMISA**	***Chinese Taipei***	***CMS/ITRI***	Kazakhstan	KazInMetr	UAE	ESMA	Antigua & Barbuda		Bulgaria	BIM
Tanzania	TBS	Hong Kong	SCL	**Russia**	**VNIIM**			Barbados		Croatia	DZM
Zambia	ZABS	India	NPLI	***Ukraine***	***NSC IM***			Dominica		Cyprus	MCIT
Zimbabwe	NMI-SIRDC	Indonesia	SNSU-BSN	Uzbekistan	UzNIM SE			Grenada		**Czechia**	**CMI**
		Japan	**NMIJ**					Guyana		Denmark	DFM
Kenya	KEBS	**Korea R.O.**	**KRISS**					Jamaica	JBS	Estonia	METROSERT
		Malaysia	NMIM					Saint Kitts & Nevis		**Finland**	**MIKES**
Morocco	LPEE-LNM	Mongolia	MASM					Saint Lucia		**France**	**LNE**
Tunisia	ANM	New Zealand	MSL-IRL					St Vincent & the Grenadines		**Germany**	**PTB**
		Pakistan	NPSL					Suriname		Greece	EIM
Egypt	NIS	Phillippines	ITDI					Trinidad & Tobago		Hungary	BFKH
Ethiopia	NMIA									Ireland	NSAI NML
Ghana	GSA	**Singapore**	**A*STAR**					Belize		**Italy**	**INRIM**
Sudan	SSMO	Sri Lanka	MUSSD					Costa Rica	LACOMET	Latvia	LATMB
		Thailand	***NIMT***					Panama	CENAMEP-AIP	Lithuania	FTMC
		Viet Nam	VMI							Luxembourg	ILNAS
								Bolivia	IBMETRO	Malta	MSA
								Colmbia	INM (CO)	Moldova	NMI (MD)
								Ecuador	INEN	Montenegro	BMM
								Peru	INACAL	**Netherlands**	**VSL**
										North Macedonia	BOM
								Agentina	***INTI***	Norway	JV
								Brazil	**INMETRO**	***Poland***	***GUM***
								Chile	INM	***Portugal***	***IPQ***
								Paraguay	INTN	Romania	INM
								Uruguay	LATU	Serbia	DMDM
										Slovakia	**SMU**
										Slovenia	MIRS
Updated	A Lewis									**Spain**	**CEM**
	07/09/2022									Sweden	RISE
										Switzerland	**METAS**
										Turkey	**UME**
										United Kingdom	**NPL**

Number
CCL-S1
CCL-S2
CCL-S3
CCL-S4
AFRIMETS.L-S3
AFRIMETS.L-S4
AFRIMETS.L-S5
APMP.L-S1
APMP.L-S2
APMP.L-S3
APMP.L-S3.4.01
APMP.L-S4
APMP.L-S5
APMP.L-S6
APMP.L-S7
APMP.L-S8
APMP.L-S9
APMP.L-S10
APMP.L-S11
COOMET.L-S1
COOMET.L-S3
COOMET.L-S6
COOMET.L-S7
COOMET.L-S8
COOMET.L-S9
COOMET.L-S10
COOMET.L-S13
COOMET.L-S14
COOMET.L-S15
COOMET.L-S16
COOMET.L-S17
COOMET.L-S18
COOMET.L-S19
COOMET.L-S20
COOMET.L-S21
COOMET.L-S22
COOMET.L-S23
COOMET.L-S24
COOMET.L-S25
COOMET.L-S26
COOMET.L-S27
COOMET.L-S28
COOMET.L-S29
COOMET.L-S30
COOMET.L-S31
COOMET.L-S32
EUROMET.L-S1
EUROMET.L-S2
EUROMET.L-S3
EUROMET.L-S4
EUROMET.L-S5a
EUROMET.L-S5b
EUROMET.L-S6
EUROMET.L-S7
EUROMET.L-S8
EUROMET.L-S9
EUROMET.L-S10

EUROMET.L-S11
EURAMET.L-S12
EUROMET.L-S13
EUROMET.L-S14
EUROMET.L-S15
EUROMET.L-S15a
EUROMET.L-S16
EUROMET.L-S17
EUROMET.L-S18
EUROMET.L-S19
EURAMET.L-S20
EURAMET.L-S21
EURAMET.L-S22
EURAMET.L-S23
EURAMET.L-S24
EURAMET.L-S25
EURAMET.L-S26
EURAMET.L-S26.1
EURAMET.L-S27
EURAMET.L-S28
EURAMET.L-S29
EURAMET.L-S30
EURAMET.L-S31
GULFMET.L-S1
GULFMET.L-S2
SIM.L-S1
SIM.L-S1.PREV
SIM.L-S2
SIM.L-S3.PREV
SIM.L-S4.PREV
SIM.L-S5
SIM.L-S6
SIM.L-S7
SIM.L-S8

Title
Nanometrology: one-dimensional gratings
Nanometrology: step height standards
Nanometrology: line scale standards
Nanometrology: two-dimensional gratings
Calibration of gauge blocks by mechanical comparison
Calibration of gauge blocks by mechanical comparison
Mechanical determination of length
Thermal expansion coefficient of gauge blocks
Nanometric lateral scale
Gauge block by mechanical comparison
Angle gauge blocks
Geometrical roundness measurements using error separation
Nano particles measurements
Long gauge blocks by comparative method
Comparison of step height measurements
Flatness of optical flat measured by flatness interferometer
Thread
Calibration of coordinate measuring machine (CMM)
Nanometrology: One-Dimensional Gratings
Comparison of comparators with photoelectric microscopes
Comparison of high accuracy gauge block interferometers
Comparison of standard of evolvent surface
Comparison of standards of Length
Comparison of striaghtness and flatness national standards
Stabilized He-Ne/I2lasers at wavelength 633 nm
Comparison of length standards for measuring gear parameters
Comparison of reference measuring instruments of surface parameters
Comparison of length standards in the range from 0.001 mm to 1 mm
Comparison of flatness standards
Comparison of standards in the field of surface density of coating measurements and coating thickness
Comparison of standards in the field of roundness measurements
Comparison of the determination of parameters linked to involute gears
Comparison of profiles of measuring bridges
Calibration of gauge blocks
Interference units for measurement of tapes up to 20 m
End standards
Comparison of precision range-finders
Comparisons of precise navigation systems GPS/GLONASS
Nanometer standards
Coordinates of one-dimensional standards
End standards
Supplementary comparisons of standards in the field of measurement of 3D parameters of surface texture
Calibration of gauge blocks by inteferometry on measurement standards of length
Involute gears using a complex standard
Linear scale
Calibration of long distance standards
Line scale measurement
Thermal expansion of gauge blocks
Depth setting standards
External diameter of wires
Roundness
Roundness profiles
Standards of thermal expansion
Flatness of surface plates
Nd:YAG lasers
Two dimensional grid
Squareness measurements

Surface texture measurements
Calibration of gauge blocks by mechanical comparison
Cylindrical artefacts
Steel tape measurements
Step height standards
Step height standards
Calibration of gauge blocks by comparison
Length intervals on a steel tape
Squareness measurements
Squareness measurements
Laser distance measuring instruments
Comparison of parallel thread gauges
Calirbation of gauge blocks by mechanical comparison
High precision roundness measurement by error separation techniques
Involute gear standards
Distance measurements using pocket-type laser instruments (EDMs)
Depth of v-shaped grooves
Depth of v-shaped grooves
Length of stainless steel tapes
Flatness of surface plates
Measurement of a 1 mm stage micrometer
Determination of roundness in the equator of two alumina spheres
Transducer displacement error
Calibration of gauge blocks by mechanical comparison
Calibration of gauge blocks by interferometry
Gauge blocks by mechanical comparison
Short gauge blocks by mechanical comparison
Comparison of surface roughness and step height (depth) standards
Measurement of Rockwell hardness indenter geometry
Linewidth standards
Nanometrology: one-dimensional grating pitch calibration by optical diffraction
Gauge blocks by mechanical comparison
Calibration of cetral length and variation of 6 steel gauge blocks
Gauge blocks measured by mechanical and interferometric technique

Participants

METAS, ITRI, IMGC, DFM, KRISS, NIM, NIST, NMIJ, NPL, PTB, VNIIM
PTB, CEM,ITRI, IMGC, DFM, GUM, KRISS, METAS, NIM, NIST, NMIJ, VSL, NPL, VNIIM
PTB, LNE, ITRI, IMGC, METAS, MIKES, NIM, NIST, NMIJ, NRC, RISE, VNIIM
DFM, CMI, ITRI, INRIM, KRISS, METAS, MIKES, NIM, NIST, NMIJ, NPL, PTB
NIS (EG), COSQ (Iraq), LCAE (Tunisia), NMISA (SA), NSCL (Syria)
LCAE (Tunisia), PTB
NIS (EG), BOBS (Botsw.), GSA (Ghana), KEBS (Kenya), LPEE-LNM (Morocco), MSB (Maurit.), NMIE (Ethio.), N
NMIJ, CENAM, CMI, INRIM, METAS, MIKES, PTB
NMIJ, PTB
KRISS, NIMT, NML-SIRIM, NPLI, NPSL (Pakistan), KIM-LIPI, VMI-STAMEQ (Viet Nam)
NIMT, EMI (UAE), A*STAR, NMIA, NMIM (Malaysia), SASO-NMCC, SE Ukremtrteststandard, SNSU-BSn (Indor
NIMT, ITRI, KRISS, NIM, A*STAR, NMIA, NMIJ, NMISA
ITRI, CENAM, DFM, INMETRO, INRIM, KRISS, LNE, METAS, NIM, NIMT, NMIA, NMIJ, PTB
NIMT, KRISS
NPLI, BEV, NIMT, A*STAR, MNIJ
NIMT, MSL, NIM, A*STAR, NMIJ, NMISA, NPLI
NIM, NIMT, A*STAR, PTB
NMIJ
NIM, KRISS, NIMT, A*STAR, NMIA, NMIJ
NSC, KazInMetr, VNIIM
NSC, KazStandard
NSC, VNIIMS
BelGIM (Belarus), GUM, KazStandard, NSC, SE Ukrmetrteststandard (Ukraine), SMU
UNIIM (Ru), BelGIM (Belarus), KazStandard
VNIIM, BelGIM, KazStandard, NSC
BelGIM, VNIIMS
NSC, VNIIMS
NSC, KazStandard
NSC, BelGIM, VNIIMS
PTB, UNIM (Ru)
NSC, BelGIM, VNIIMS
NSC, PTB, VNIIMS
BelGIM, KazStandard
NMI (MD), INM (RO), PTB, VMC
VNIIM, BelGIM, KazStandard
NSC, GEOSTM (Georgia)
NSC, NIM
NSC, BelGIM, NIM
NSC, PTB
NSC, BelGIM, VNIIMS
NSC, BelGIM, FTMC (Lithuania), GEOSTM (Georgia), KazStandard, UzNIM (Uzbekistan)
VNIIMS, BelGIM, KazInMetr
BelGIM, KazStandard, NSC, PTB, SE Ukrmetteststandard, VNIIM
VNIIMS, BelGIM
BelGIM, KazStandard, NSC, SE Ukrmetrteststandard, VNIIM
BelGIM, SE Ukrmetteststandard, VNIIFTRI, VNIIM
BIPM, LNE, MIKES, INRIM, METAS, NMI-VSL, NPL, PTB, RISE
METAS, INRIM, NMI-VSL, NPL, PTB
TUE (NL), CEM, INRIM, METAS, NIST, VSL, PTB, RISE, MIKES
LNE, METAS, NPL, PTB
RISE, LNE, INRIM, DTH (DK), METAS, VSL, PTB
TUE (NL), INRIM, METAS, VSL, PTB, RISE
PTB, NMI-VSL, NPL
PTB, VSL, NPL, MIKES
INRIM, PTB
NPL, PTB
SMU, LNE, CEM, GUM, IPQ, METAS, MIKES, VSL, BFKH, PTB, SMIS, RISE

PTB, BEV, CEM, CMI, INRIM, DFM, GUM, IPQ, METAS, MIKES, VSL, NPL, SMU, RISE, UME, VMT
NML(IE), BEV, CMI, EIM, GUM, MIKES, MIRS, BIM (BG), NPL, BFKH, UME, VMT/VMC
PTB, LNE, IMRIM, METAS, NIST, VSL, RISE
METAS, BEV, CEM, CMI, GUM, INM, JV, LATMB, MIKES, MIRS, BIM, NMIA (Australia), BFKH, PTB, SMD, RIS
PTB, CMI, INRIM, METAS, VSL
PTB, CMI, INRIM, MIKES, A*STAR, VSL
NPL, FSB, INM, JV, LATMB, METROSERT, MSA, NML (IE), SMD
METAS, METROSERT, UME
SMU, MIKES
SMU, GUM
GUM, METROSERT, BEV, CEM, CMI, INM, INRIM, JV, METAS, MIKES, PTB, SMU, RISE
FSBm METROSERT, BEV, INRIM, LNE, METAS, MIKES, MIRS, BFKH, UME
DTI (DK), METROSERT, BEV, BMM (Montenegro), CEM, DFM, LATMB, MCCAA-SMI (Malta), MIRS, NPL, NSA
CEM, DTI, INRIM, IPQ, LNE, SMD, VSL
PTB, NGML, NIM, NIMT, NMIJ, NSC
CEM, BEV, VSL
PTB, BEV, CEM, GUM, INRIM, MIKES, NMISA, SP, UME, VNIIMS
MIKES, CEM, PTB, UME
PTB, METROSERT, BEV, BFKH, BIM, BMM, CEM, CMS, GUM, INTI (Arge.), IPQ, JV, LATMB, MASM (Mong.),
PTB, NIM, NMIJ, VNIIMS
BEV, CEM, DMDM, GUM, INM, INMETRO, INRIM, INTI, NIM, NIMT, NMISA, RISE, UME
CEM, DTI, INRIM, LNE, VSL
MIRS, BEV, CEM, DFM, DTI, JV, METAS, MIKES, VSL
EMI (UAE), DGSM (Oman), DPM (Albania), NMIM (Malasia), PAI (Kuwait), SASA (SA), UME
UME, SASO
NRC, CEM, INDECOPI (Peru), INMETRO, INTI, LCPN-DICTU (Chile), LPMP-UTP (Panama), NIST, SIC (Colom
CEM, CCCM (Colombia), CERTI (Brazil), CI-UNAM (MX), CIDESI (MX), INDECOPI (Peru), INMETRO, INTI, PT
NRC, CENAM, INMETRO, INTI, NIST
NIST, INRIM, MPA-NRW (DE), NIM, NMIJ, UM (IT)
NIST, NPL
NRC, ITRI, METAS, PTB
CENAM, BSJ (Jam.), CENAMEP AIP (Pana.), CMI, DICTUC (Chile), IBMETRO (Boliv.), INDECOPI, INEN (Ecua
INTI, BSJ, CENAM, CANAMEP AIP, DICTUC, IBMETRO, INACAL (Peru), INEN, INM (Colombia), INMETRO, LA
INTI, CENAM, DICTUC, INACAL, INM (Colombia), INMETRO, NIST, NRC

ι.), INMETRO, INTI, LACOMET (Costa R.), LATU (Urug.), NIST, NPLI, SIC (Colom.), TTBS (CARICOM

/Trin Tob.)