Key comparison CCM.P-K1.b

MEASURAND : Effective area of two piston-cylinder units, DH 6594 and DHI 107, from 50 kPa to 1 MPa
NOMINAL VALUE : 10 cm^2 for both units
x_i : result of measurement carried out by laboratory *i*
u_i : combined standard uncertainty of x_i

Piston-cylinder DH 6594

nominal pressure / kPa	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}
50	980.4989	8.4			980.4975	5.0	980.4979	3.9
100	980.4991	8.7	980.4912	7.6	980.4975	4.9	980.4920	3.3
200	980.4926	9.1	980.4890	7.0	980.4966	4.1	980.4915	3.1
400	980.4902	10.1	980.4899	6.8	980.4968	3.7	980.4917	3.0
600	980.4894	11.1	980.4899	6.7	980.4971	3.7	980.4927	2.9
800	980.4893	12.1	980.4910	6.6	980.4970	3.7	980.4930	2.9
1000	980.4901	13.1	980.4914	6.6	980.4971	3.7	980.4935	2.9
	NIST, Sep. 96		INRIM, Nov. 95		PTB, Aug. 95 and Oct. 97		LNE, Apr. 1997	

Piston-cylinder DHI 107

nominal pressure / kPa	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}
50	980.5163	8.8			980.5215	5.2	980.5199	3.9
100	980.5259	8.7	980.5257	7.6	980.5217	5.0	980.5171	3.4
200	980.5232	9.2	980.5229	7.0	980.5225	4.1	980.5177	3.1
400	980.5232	10.1	980.5213	6.8	980.5223	3.8	980.5186	3.0
600	980.5206	11.1	980.5205	6.7	980.5218	3.7	980.5193	2.9
800	980.5201	12.1	980.5200	6.6	980.5220	3.7	980.5190	2.9
1000	980.5199	13.1	980.5201	6.6	980.5224	3.7	980.5185	2.9
	NIST, May 96		INRIM, Oct. 96		PTB, Dec. 96		LNE, Sep. 95 and Mar. 97	

Key comparison EUROMET.M.P-K3.a

MEASURAND : Effective area of piston-cylinder unit DH 6594, from 50 kPa to 1 MPa
NOMINAL VALUE : 10 cm^2
x_i : result of measurement carried out by laboratory *i*
u_i : combined standard uncertainty of x_i

Piston-cylinder DH 6594

nominal pressure / kPa	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}
50	980.4957	6.2						
100	980.4931	5.6	980.4964	15	980.5063	30	980.4975	5.9
200	980.4904	5.4	980.4955	15	980.5108	30	980.4976	5.5
400	980.4904	5.2	980.4950	15	980.5061	20	980.4980	5.4
600	980.4908	5.2	980.4952	15	980.5048	20	980.4997	5.4
800	980.4913	5.2	980.4946	15	980.5082	20	980.5011	5.3
1000	980.4920	5.1	980.4938	15	980.5094	20	980.5000	5.2
	LNE, Mar. 00 and June 01		NMi-VSL, Apr. 2000		BEV, July 2000		CMI, Oct. 2000	

nominal pressure / kPa	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}	x_i / mm^2	u_i / x_i / 10^{-6}
50			980.4930	6.6		
100	980.4723	9.8	980.4918	6.6	980.4946	22
200	980.4726	9.7	980.4885	6.6	980.4922	22
400	980.4691	8.7	980.4885	6.6	980.4924	22
600	980.4731	8.7	980.4888	6.6	980.4926	22
800	980.4683	8.6	980.4890	6.6	980.4929	22
1000	980.4717	8.6	980.4893	6.7	980.4931	22
	VNIIM, Feb. 2001		CEM, Apr. 2001		IPQ, May 2001	

Key comparison COOMET.M.P-K1

MEASURAND : **Effective area of piston-cylinder unit VNIIM-7 between 50 kPa and 500 kPa**
NOMINAL VALUE : **5 cm^2**
x_i**:** **result of measurement carried out by laboratory *i*, based on the arithmetic average of at least 10 experimental points using one or several standards as a reference**
u_i**:** **combined standard uncertainty of x_i**

Piston-cylinder VNIIM-7

Laboratories maintaining primary standards

nominal pressure / kPa	x_i / cm^2	u_i / x_i / 10^{-6}	x_i / cm^2	u_i / x_i / 10^{-6}
50	**4.999658**	11	**4.999728**	6.3
100	**4.999643**	11	**4.999721**	5.5
200	**4.999646**	9.9	**4.999716**	5.2
300	**4.999650**	8.0	**4.999714**	5.1
400	**4.999652**	7.5	**4.999714**	5.1
500	**4.999654**	7.2	**4.999712**	5.1
	VNIIM, Sep 2004 - Jun 2006		**PTB, Nov 2004**	

Laboratories maintaining secondary standards

nominal pressure / kPa	x_i / cm^2	u_i / x_i / 10^{-6}	x_i / cm^2	u_i / x_i / 10^{-6}	x_i / cm^2	u_i / x_i / 10^{-6}	x_i / cm^2	u_i / x_i / 10^{-6}
50	**4.999685**	25	**4.999755**	19	**4.999884**	34	**5.000171**	37
100	**4.999685**	23	**4.999764**	18	**4.999840**	32	**5.000061**	31
200	**4.999693**	22	**4.999768**	17	**4.999827**	23	**4.999997**	28
300	**4.999752**	21	**4.999768**	17			**4.999976**	27
400	**4.999757**	21	**4.999771**	17			**4.999955**	27
500	**4.999752**	21	**4.999771**	17			**4.999941**	26
	VMT/VMC, Apr 2005		**SMU, Aug 2005**		**BelGIM, Dec 2005**		**INM(RO), Apr 2006**	

Key comparison CCM.P-K1.b

MEASURAND : Effective area of two piston-cylinder units, DH 6594 and DHI 107, from 50 kPa to 1 MPa
NOMINAL VALUE : 10 cm^2 for both units

The key comparison reference value, x_R, for each transfer standard is obtained as the average value of 24 individual results (6 results per participant laboratory, for pressure from 100 kPa to 1000 kPa).
The standard uncertainty of each reference value, u_R, is taken as the standard deviation of the mean (24 values).

Piston-cylinder DH 6594	$x_R = 980.4929\ mm^2$	$u_R / x_R = 0.65 \cdot 10^{-6}$
Piston-cylinder DHI 107	$x_R = 980.5211\ mm^2$	$u_R / x_R = 0.47 \cdot 10^{-6}$

The degree of equivalence of each laboratory with respect to each key comparison reference value is given by a pair of terms:
$D_i = (x_i - x_R) / x_R$, **the relative deviation from the reference value, and** $U_i = 2\,(u_i^2 + u_R^2)^{1/2} / x_R$, **its expanded uncertainty (**$k = 2$**).**

The degree of equivalence between two laboratories is given for each transfer standard by a pair of terms:
$D_{ij} = D_i - D_j = (x_i - x_j) / x_R$, **the relative difference between their results, and**
$U_{ij} = 2\,(u_i^2 + u_j^2)^{1/2} / x_R$, **its expanded uncertainty (**$k = 2$**).**
The pair-wise degrees of equivalence are computed for nominal pressures 100 kPa, 600 kPa, and 1000 kPa for both units.

Linking key comparison EUROMET.M.P-K3.a to CCM.P-K1.b

Linkage between EUROMET.M.P-K3.a and CCM.P-K1.b results using Piston-cylinder DH 6594 is obtained from the common participation of the LNE in both key comparisons.
Details of computation are given in Sections 5 and 6 of the EUROMET.M.P-K3.b Final Report.

The degree of equivalence of the EUROMET.M.P-K3.a participants with respect to the key comparison reference value is given by a pair of terms: a relative offset, D_i, and its expanded uncertainty ($k = 2$), U_i, computed as stated on page 9 of the EUROMET.M.P-K3.a Final Report. This uncertainty includes a component related to the transfer standard stability.

The degree of equivalence between two laboratories is given by the observed relative difference D_{ij} and its expanded uncertainty ($k = 2$), U_{ij}, calculated as the quadratic combination of the two laboratory uncertainties and the uncertainty related to the transfer standard stability.
The matrices of equivalence obtained in CCM.P-K1.b for nominal pressures 100 kPa, 600 kPa, and 1000 kPa using Piston-Cylinder DH 6594 are extended with pair-wise degrees of equivalence involving the participants in EUROMET.M.P-K3.a.

Linking key comparison COOMET.M.P-K1 to CCM.P-K1.b

Linkage between COOMET.M.P-K1 and CCM.P-K1.b results is obtained from the common participation of PTB in both key comparisons.
Details of computation are given in Section 9 of the COOMET.M.P-K1 Final Report.

The degree of equivalence of the COOMET.M.P-K1 participants with respect to the key comparison reference value is given by a pair of terms: a relative offset, D_i, and its expanded uncertainty ($k = 2$), U_i, computed as stated on page 18 of the COOMET.M.P-K1 Final Report. This uncertainty includes a component related to the transfer standard stability.

The matrix of equivalence obtained in CCM.P-K1.b for nominal pressure 100 kPa is extended with pair-wise degrees of equivalence involving the participants in EUROMET.M.P-K3.a and COOMET.M.P-K1.

Key comparisons CCM.P-K1.b, EUROMET.M.P-K3.a, and COOMET.M.P-K1

Degrees of equivalence relative to the CCM.P-K1.b key comparison reference values

Piston-cylinders DH 6594 and VNIIM-7

	50 kPa		100 kPa		200 kPa		400 kPa		600 kPa		800 kPa		1000 kPa	
	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}
NIST	**6.1**	16.9	**6.3**	17.5	**-0.3**	18.3	**-2.7**	20.2	**-3.6**	22.2	**-3.7**	24.2	**-2.8**	26.1
INRIM	**-**	**-**	**-1.8**	15.2	**-4.0**	14.1	**-3.1**	13.7	**-3.0**	13.5	**-1.9**	13.3	**-1.5**	13.3
PTB	**4.7**	10.2	**4.7**	9.9	**3.8**	8.2	**4.0**	7.6	**4.2**	7.5	**4.2**	7.5	**4.2**	7.6
LNE	**5.2**	8.0	**-0.9**	6.8	**-1.4**	6.4	**-1.2**	6.1	**-0.2**	6.0	**0.1**	5.9	**0.6**	5.9
NMi-VSL	**-**	-	**3.6**	32	**2.7**	32	**2.2**	32	**2.4**	32	**1.7**	32	**0.9**	32
BEV	**-**	-	**14**	60	**18**	60	**13**	40	**12**	40	**16**	40	**17**	40
CMI	**-**	-	**4.7**	14.4	**4.8**	13.8	**5.2**	13.6	**6.9**	13.6	**8.4**	13.4	**7.3**	13.2
VNIIM	**-**	-	**-21**	22	**-21**	22	**-24**	19.2	**-20**	19.2	**-25**	19.2	**-22**	19.2
CEM	**0.1**	16.2	**-1.1**	16.2	**-4.5**	16.2	**-4.5**	16.2	**-4.2**	16.2	**-4.0**	16.2	**-3.7**	16.2
IPQ	**-**	-	**1.8**	46	**-0.7**	46	**-0.5**	46	**-0.2**	46	**0.0**	46	**0.2**	46
VNIIM	**-14**	28	**-13**	27	**-11**	25	**-9.8**	21						
VMT/VMC	**-8.1**	53	**-4.6**	48	**-2.0**	46	**11**	44						
SMU	**5.9**	42	**11**	39	**13**	37	**14**	37						
BelGIM	**32**	70	**26**	65	**25**	48	**-**	-						
INM(RO)	**89**	77	**71**	64	**59**	58	**51**	55						

Piston-cylinder DHI 107

	50 kPa		100 kPa		200 kPa		400 kPa		600 kPa		800 kPa		1000 kPa	
	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}	D_i / 10^{-6}	U_i / 10^{-6}
NIST	**-4.8**	17.6	**4.9**	17.4	**2.1**	18.4	**2.2**	20.3	**-0.5**	22.2	**-1.0**	24.1	**-1.2**	26.1
INRIM	**-**	**-**	**4.7**	15.3	**1.9**	14.1	**0.2**	13.7	**-0.6**	13.5	**-1.1**	13.3	**-1.0**	13.3
PTB	**0.5**	10.5	**0.6**	10.0	**1.4**	8.3	**1.2**	7.6	**0.7**	7.5	**0.9**	7.5	**1.4**	7.5
LNE	**-1.2**	7.8	**-4.0**	6.8	**-3.5**	6.2	**-2.5**	6.0	**-1.8**	5.9	**-2.1**	5.9	**-2.7**	5.9

Key comparisons CCM.P-K1.b, EUROMET.M.P-K3.a, and COOMET.M.P-K1

Matrix of equivalence for nominal pressure 100 kPa
Piston-cylinders DH 6594 and VNIIM-7

Lab *j* ⇒

Lab *i* ⇓			**NIST**		**INRIM**		**PTB**		**LNE**		**NMI-VSL**		**BEV**		**CMI**		**VNIIM**	
	D_i / 10^{-6}	U_i / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	**6.3**	17.5			**8.1**	23	**1.6**	20	**7.3**	19	**3**	36	**-8**	63	**2**	23	**27**	28
INRIM	**-1.8**	15.2	**-8.1**	23			**-6.5**	18	**-0.8**	17	**-5**	35	**-16**	62	**-6**	21	**19**	27
PTB	**4.7**	9.9	**-1.6**	20	**6.5**	18			**5.6**	12	**1**	34	**-9**	61	**0**	17	**26**	24
LNE	**-0.9**	6.8	**-7.3**	19	**0.8**	17	**-5.6**	12			**-5**	33	**-15**	60	**-6**	16	**20**	23
NMi-VSL	**3.6**	32	**-3**	36	**5**	35	**-1**	34	**5**	33			**-10**	68	**-1**	35	**25**	39
BEV	**14**	60	**8**	63	**16**	62	**9**	61	**15**	60	**10**	68			**9**	62	**35**	64
CMI	**4.7**	14.4	**-2**	23	**6**	21	**0**	17	**6**	16	**1**	35	**-9**	62			**26**	26
VNIIM	**-21**	22	**-27**	28	**-19**	27	**-26**	24	**-20**	23	**-25**	39	**-35**	64	**-26**	26		
CEM	**-1.1**	16.2	**-7**	24	**1**	22	**-6**	19	**0**	18	**-5**	36	**-15**	62	**-6**	22	**20**	27
IPQ	**1.8**	46	**-5**	49	**4**	48	**-3**	47	**3**	47	**-2**	56	**-12**	76	**-3**	48	**23**	51
VNIIM	**-13**	27	**-19**	32	**-14**	31	**-16**	29	**-11**	28	**-17**	42	**-27**	66	**-18**	30	**-**	-
VMT/VMC	**-4.6**	48	**-10**	51	**-6**	50	**-7**	49	**-2**	49	**-8**	58	**-19**	77	**-9**	50	**16**	53
SMU	**11**	39	**6**	42	**10**	41	**9**	40	**14**	39	**8**	50	**-3**	71	**7**	41	**32**	44
BelGIM	**26**	65	**21**	67	**25**	67	**24**	66	**29**	65	**23**	72	**12**	88	**22**	67	**47**	69
INM(RO)	**71**	64	**65**	67	**69**	66	**68**	65	**73**	65	**67**	72	**57**	88	**66**	66	**92**	68

Key comparisons CCM.P-K1.b, EUROMET.M.P-K3.a, and COOMET.M.P-K1

Matrix of equivalence for nominal pressure 100 kPa (Continued)

Piston-cylinders DH 6594 and VNIIM-7

Lab *j* ⇒

Lab *i* ⇓	D_i / 10^{-6}	U_i / 10^{-6}	CEM		IPQ		VNIIM		VMT/VMC		SMU		BelGIM		INM(RO)	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	**6.3**	17.5	**7**	24	**5**	49	**19**	32	**10**	51	**-6**	42	**-21**	67	**-65**	67
INRIM	**-1.8**	15.2	**-1**	22	**-4**	48	**14**	31	**6**	50	**-10**	41	**-25**	67	**-69**	66
PTB	**4.7**	9.9	**6**	19	**3**	47	**16**	29	**7**	49	**-9**	40	**-24**	66	**-68**	65
LNE	**-0.9**	6.8	**0**	18	**-3**	47	**11**	28	**2**	49	**-14**	39	**-29**	65	**-73**	65
NMi-VSL	**3.6**	32	**5**	36	**2**	56	**17**	42	**8**	58	**-8**	50	**-23**	72	**-67**	72
BEV	**14**	60	**15**	62	**12**	76	**27**	66	**19**	77	**3**	71	**-12**	88	**-57**	88
CMI	**4.7**	14.4	**6**	22	**3**	48	**18**	30	**9**	50	**-7**	41	**-22**	67	**-66**	66
VNIIM	**-21**	22	**-20**	27	**-23**	51	**-**	-	**-16**	53	**-32**	44	**-47**	69	**-92**	68
CEM	**-1.1**	16.2			**-3**	49	**12**	31	**3**	51	**-12**	42	**-28**	67	**-72**	66
IPQ	**1.8**	46	**3**	49			**15**	53	**6**	67	**-9**	60	**-25**	80	**-69**	79
VNIIM	**-13**	27	**-12**	31	**-15**	53			**-8**	50	**-24**	41	**-39**	67	**-84**	66
VMT/VMC	**-4.6**	48	**-3**	51	**-6**	67	**8**	50			**-16**	57	**-31**	78	**-75**	77
SMU	**11**	39	**12**	42	**9**	60	**24**	41	**16**	57			**-15**	72	**-59**	72
BelGIM	**26**	65	**28**	67	**25**	80	**39**	67	**31**	78	**15**	72			**-70**	89
INM(RO)	**71**	64	**72**	66	**69**	79	**84**	66	**75**	77	**59**	72	**70**	89		

Key comparisons CCM.P-K1.b and EUROMET.M.P-K3.a

Matrices of equivalence

Piston-cylinder DH 6594 **Nominal pressure : 600 kPa**

Lab *j* ⟹

Lab *i* ⇩	D_i / 10^{-6}	U_i / 10^{-6}	NIST		INRIM		PTB		LNE		NMI-VSL		BEV	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	-3.6	22.2			-0.5	26	-7.8	23	-3.3	23	-6	39	-16	46
INRIM	-3.0	13.5	0.5	26			-7.3	15	-2.8	15	-5	35	-15	42
PTB	4.2	7.5	7.8	23	7.3	15			4.5	10	2	33	-8	41
LNE	-0.2	6.0	3.3	23	2.8	15	-4.5	10			-3	33	-12	40
NMi-VSL	2.4	32	6	39	5	35	-2	33	3	33			-10	51
BEV	12	40	16	46	15	42	8	41	12	40	10	51		
CMI	6.9	13.6	10	26	10	19	3	16	7	15	5	35	-5	42
VNIIM	-20	19.2	-16	29	-17	23	-24	21	-20	20	-22	37	-32	44
CEM	-4.2	16.2	-1	27	-1	21	-8	18	-4	17	-7	36	-16	43
IPQ	-0.2	46	3	51	3	48	-4	47	0	46	-3	56	-12	61

Lab *i* ⇩	D_i / 10^{-6}	U_i / 10^{-6}	CMI		VNIIM		CEM		IPQ	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	-3.6	22.2	-10	26	16	29	1	27	-3	51
INRIM	-3.0	13.5	-10	19	17	23	1	21	-3	48
PTB	4.2	7.5	-3	16	24	21	8	18	4	47
LNE	-0.2	6.0	-7	15	20	20	4	17	0	46
NMi-VSL	2.4	32	-5	35	22	37	7	36	3	56
BEV	12	40	5	42	32	44	16	43	12	61
CMI	6.9	13.6			27	24	11	21	7	48
VNIIM	-20	19.2	-27	24			-16	25	-20	50
CEM	-4.2	16.2	-11	21	16	25			-4	49
IPQ	-0.2	46	-7	48	20	50	4	49		

Key comparisons CCM.P-K1.b and EUROMET.M.P-K3.a

Piston-cylinder DH 6594 **Nominal pressure : 1000 kPa**

Lab *j* ⟹

Lab *i* ⇩	D_i / 10^{-6}	U_i / 10^{-6}	NIST		INRIM		PTB		LNE		NMI-VSL		BEV	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	**-2.8**	26.1			**-1.4**	29	**-7.1**	27	**-3.4**	27	**-4**	41	**-20**	48
INRIM	**-1.5**	13.3	**1.4**	29			**-5.7**	15	**-2.1**	15	**-2**	35	**-18**	42
PTB	**4.2**	7.6	**7.1**	27	**5.7**	15			**3.7**	10	**3**	33	**-13**	41
LNE	**0.6**	5.9	**3.4**	27	**2.1**	15	**-3.7**	10			**0**	33	**-16**	40
NMi-VSL	**0.9**	32	**4**	41	**2**	35	**-3**	33	**0**	33			**-16**	51
BEV	**17**	40	**20**	48	**18**	42	**13**	41	**16**	40	**16**	51		
CMI	**7.3**	13.2	**10**	29	**9**	19	**3**	15	**7**	14	**6**	35	**-10**	42
VNIIM	**-22**	19.2	**-19**	32	**-21**	23	**-26**	21	**-23**	20	**-23**	37	**-39**	44
CEM	**-3.7**	16.2	**-1**	31	**-2**	21	**-8**	18	**-4**	17	**-5**	36	**-21**	43
IPQ	**0.2**	46	**3**	53	**2**	48	**-4**	47	**0**	46	**-1**	56	**-17**	61

Lab *i* ⇩	D_i / 10^{-6}	U_i / 10^{-6}	CMI		VNIIM		CEM		IPQ	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	**-2.8**	26.1	**-10**	29	**19**	32	**1**	31	**-3**	53
INRIM	**-1.5**	13.3	**-9**	19	**21**	23	**2**	21	**-2**	48
PTB	**4.2**	7.6	**-3**	15	**26**	21	**8**	18	**4**	47
LNE	**0.6**	5.9	**-7**	14	**23**	20	**4**	17	**0**	46
NMi-VSL	**0.9**	32	**-6**	35	**23**	37	**5**	36	**1**	56
BEV	**17**	40	**10**	42	**39**	44	**21**	43	**17**	61
CMI	**7.3**	13.2			**29**	23	**11**	21	**7**	48
VNIIM	**-22**	19.2	**-29**	23			**-18**	25	**-22**	50
CEM	**-3.7**	16.2	**-11**	21	**18**	25			**-4**	49
IPQ	**0.2**	46	**-7**	48	**22**	50	**4**	49		

Key comparison CCM.P-K1.b

Piston-cylinder DHI 107 **Nominal pressure : 100 kPa**

Lab *j* ⟹

Lab *i* ⇩	D_i / 10^{-6}	U_i / 10^{-6}	NIST		INRIM		PTB		LNE	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	**4.9**	17.4			**0.2**	23	**4.3**	20	**9.0**	19
INRIM	**4.7**	15.3	**-0.2**	23			**4.1**	18	**8.7**	17
PTB	**0.6**	10.0	**-4.3**	20	**-4.1**	18			**4.6**	12
LNE	**-4.0**	6.8	**-9.0**	19	**-8.7**	17	**-4.6**	12		

Piston-cylinder DHI 107 **Nominal pressure : 600 kPa**

Lab *j* ⟹

Lab *i* ⇩	D_i / 10^{-6}	U_i / 10^{-6}	NIST		INRIM		PTB		LNE	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	**-0.5**	22.2			**0.1**	26	**-1.2**	23	**1.3**	23
INRIM	**-0.6**	13.5	**-0.1**	26			**-1.3**	15	**1.2**	15
PTB	**0.7**	7.5	**1.2**	23	**1.3**	15			**2.5**	9
LNE	**-1.8**	5.9	**-1.3**	23	**-1.2**	15	**-2.5**	9		

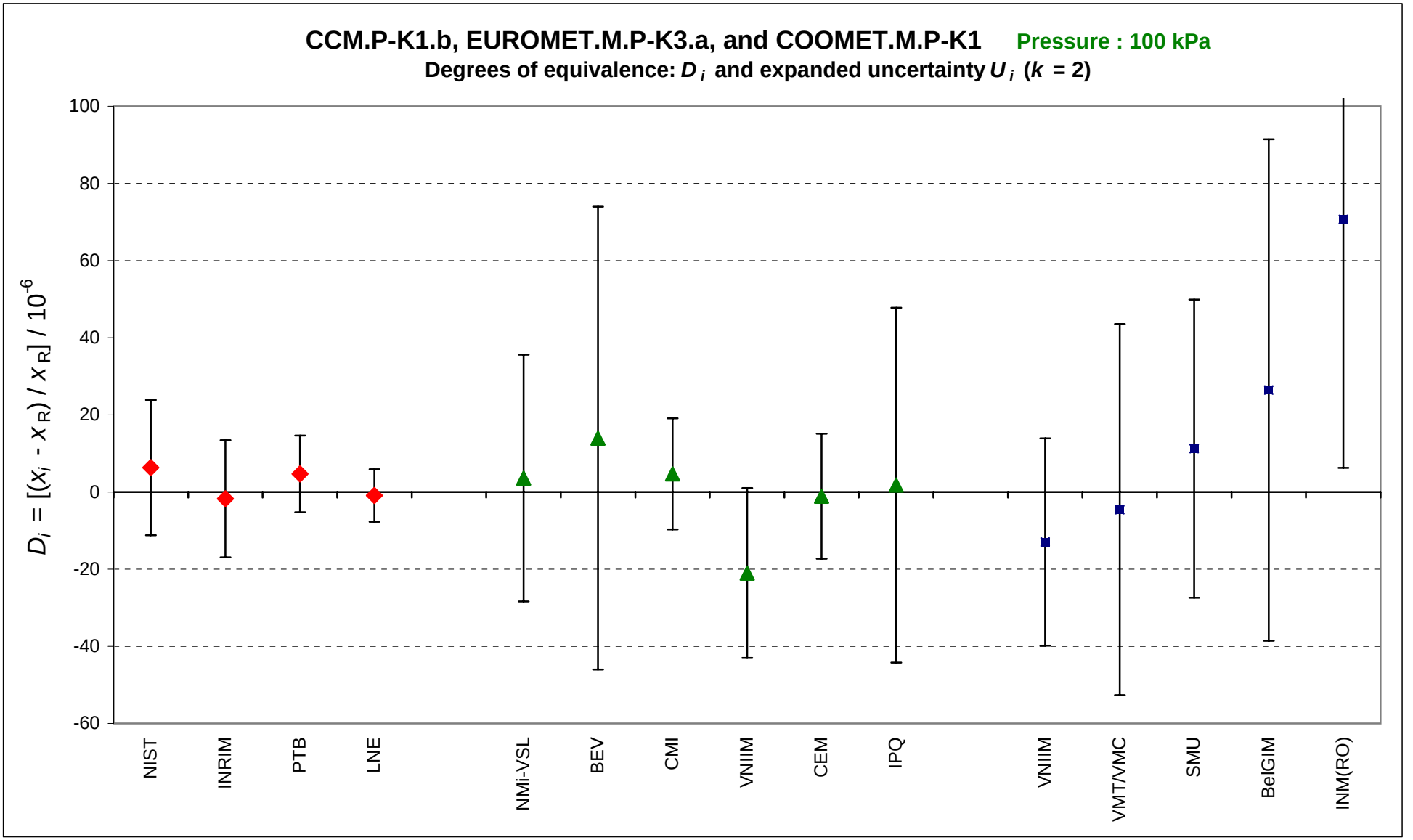
Piston-cylinder DHI 107 **Nominal pressure : 1000 kPa**

Lab *j* ⟹

Lab *i* ⇩	D_i / 10^{-6}	U_i / 10^{-6}	NIST		INRIM		PTB		LNE	
			D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}	D_{ij} / 10^{-6}	U_{ij} / 10^{-6}
NIST	**-1.2**	26.1			**-0.2**	29	**-2.6**	27	**1.4**	27
INRIM	**-1.0**	13.3	**0.2**	29			**-2.4**	15	**1.7**	14
PTB	**1.4**	7.5	**2.6**	27	**2.4**	15			**4.0**	9
LNE	**-2.7**	5.9	**-1.4**	27	**-1.7**	14	**-4.0**	9		

CCM.P-K1.b, EUROMET.M.P-K3.a, and COOMET.M.P-K1 Pressure : 100 kPa

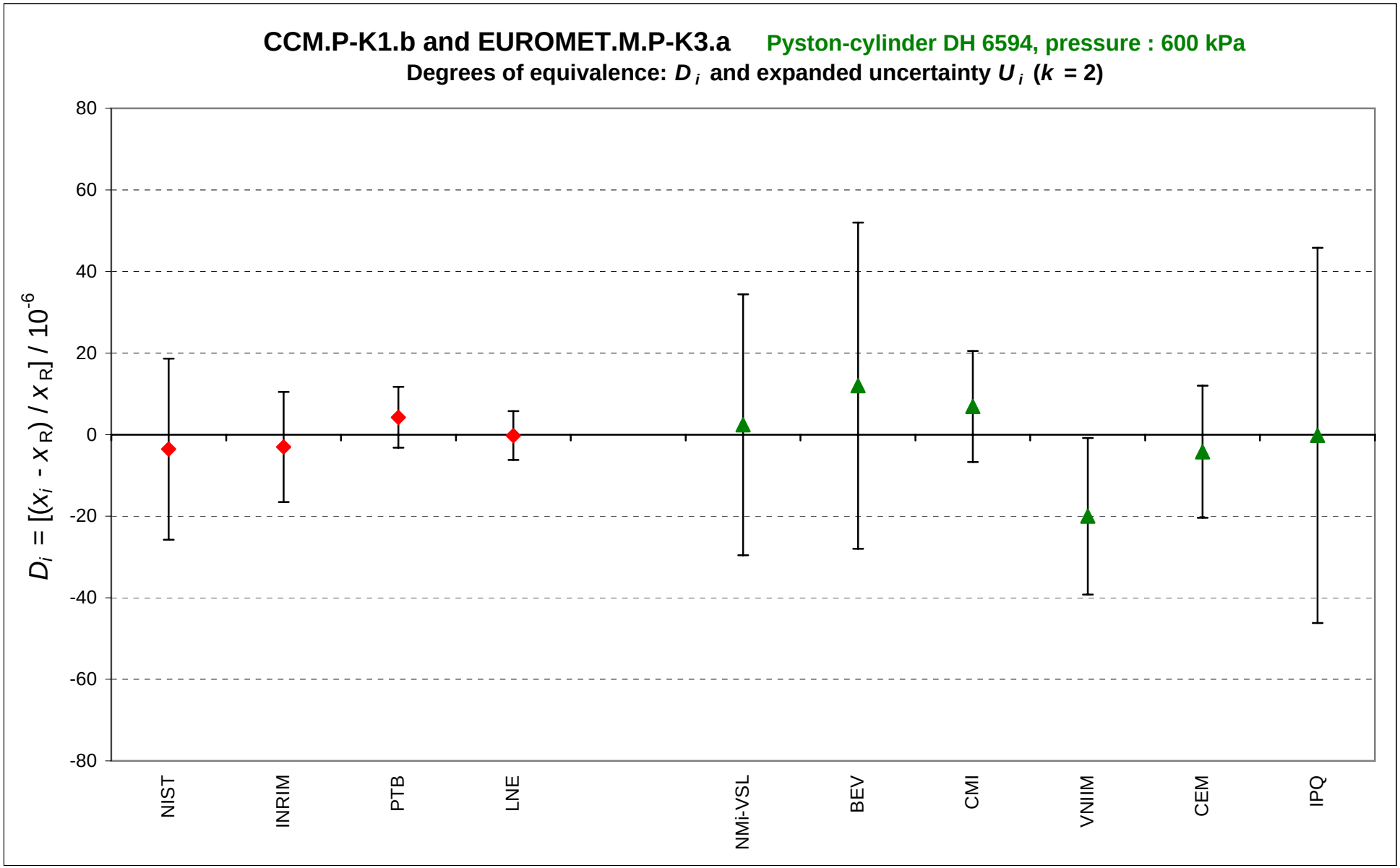
Degrees of equivalence: D_i and expanded uncertainty U_i (k = 2)



Red diamonds: participants in CCM.P-K1.b
Green triangles: participants in EUROMET.M.P-K3.a only
Blue squares: participants in COOMET.M.P-K1 only

CCM.P-K1.b and EUROMET.M.P-K3.a Pyston-cylinder DH 6594, pressure : 600 kPa

Degrees of equivalence: D_i and expanded uncertainty U_i (k = 2)

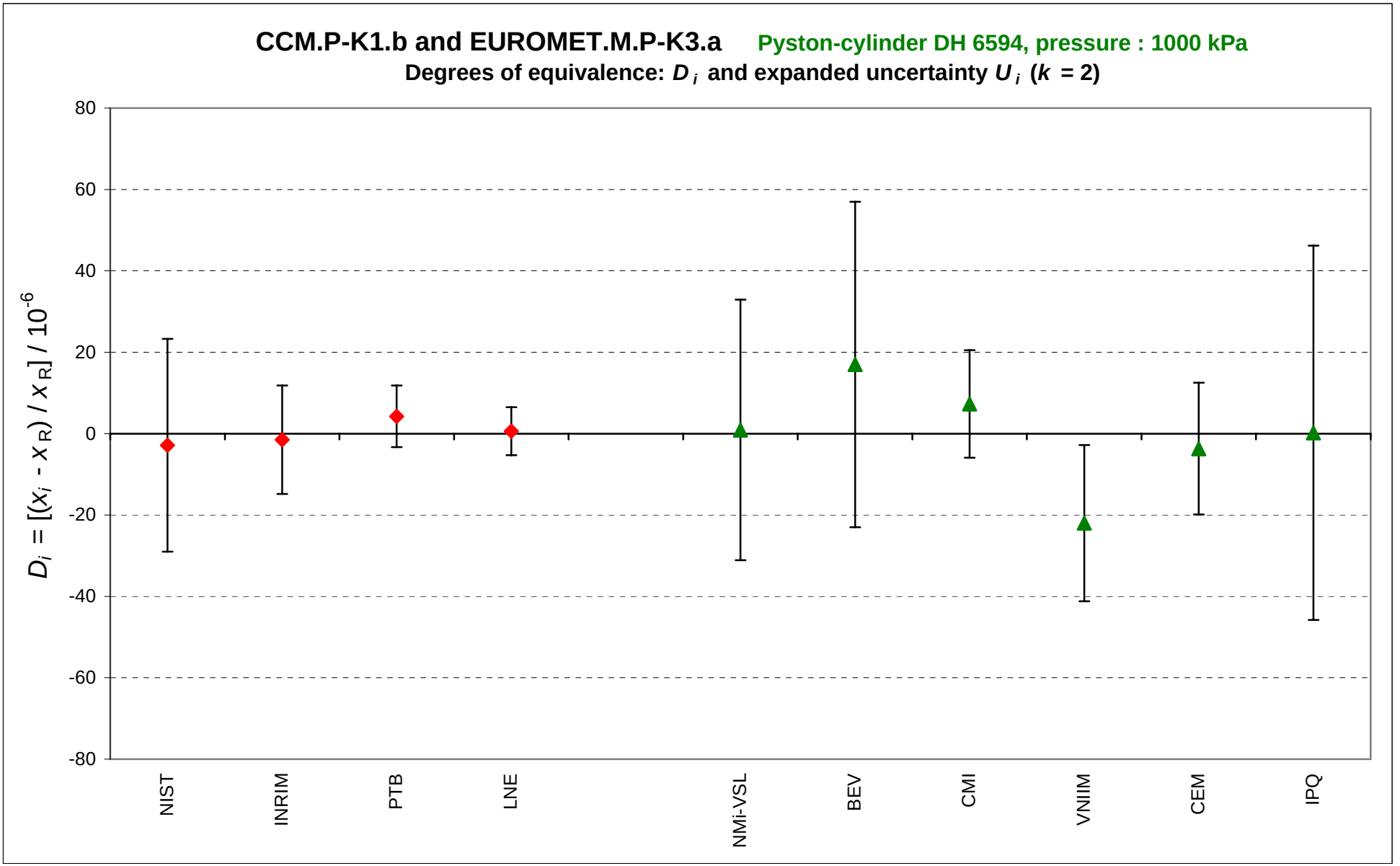


Red diamonds: participants in CCM.P-K1.b

Green triangles: participants in EUROMET.M.P-K3.a only

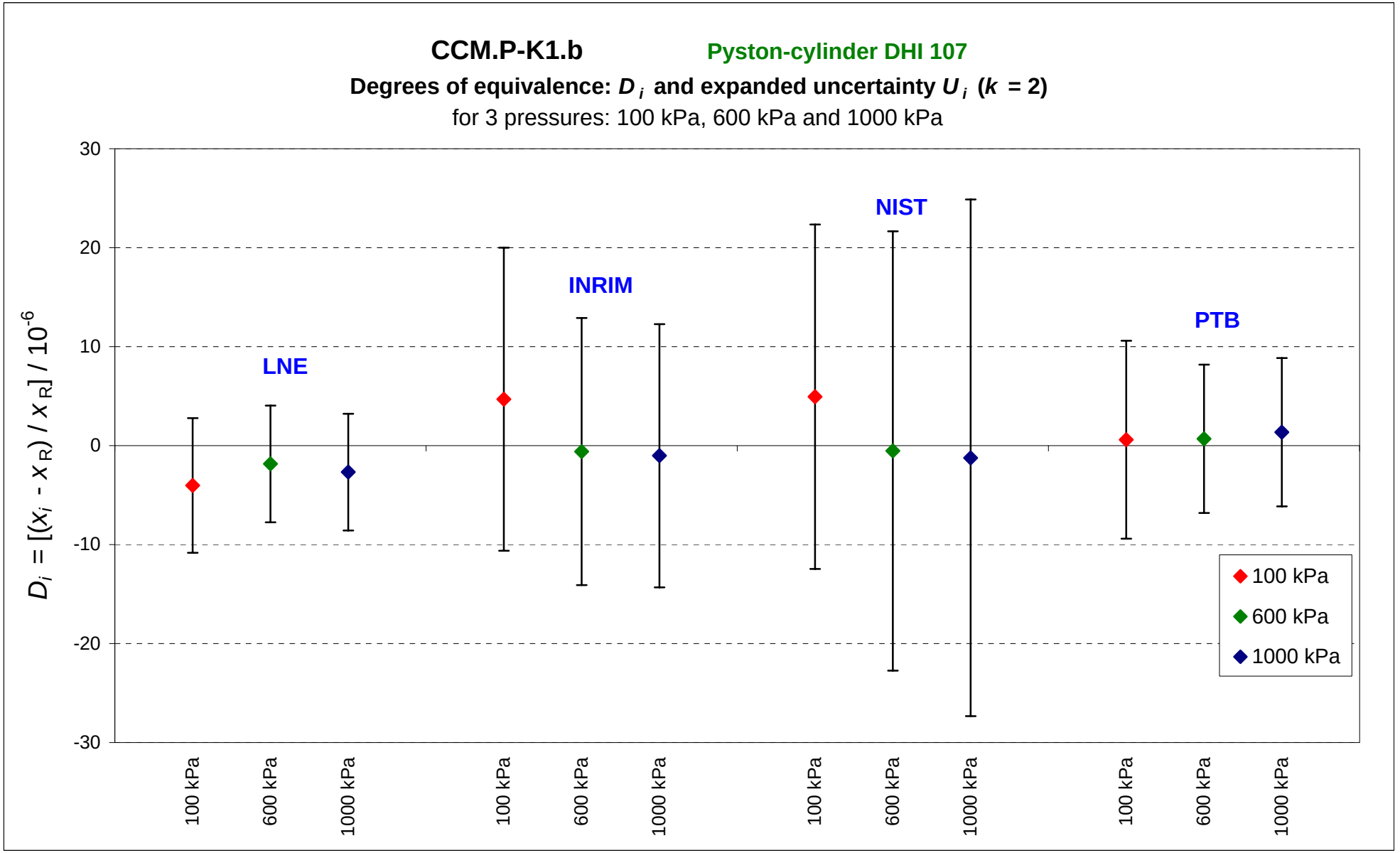
CCM.P-K1.b and EUROMET.M.P-K3.a Pyston-cylinder DH 6594, pressure : 1000 kPa

Degrees of equivalence: D_i and expanded uncertainty U_i (k = 2)



Red diamonds: participants in CCM.P-K1.b

Green triangles: participants in EUROMET.M.P-K3.a only


CCM.P-K1.b
Pyston-cylinder DHI 107
Degrees of equivalence: D_i and expanded uncertainty U_i (k = 2)
for 3 pressures: 100 kPa, 600 kPa and 1000 kPa
$D_i = [(x_i - x_R) / x_R] / 10^{-6}$
30
20
10
0
-10
-20
-30
LNE
INRIM
NIST
PTB
100 kPa
600 kPa
1000 kPa
100 kPa
600 kPa
1000 kPa
100 kPa
600 kPa
1000 kPa
100 kPa
600 kPa
1000 kPa
100 kPa
600 kPa
1000 kPa