

**CCM.P-K4 and EUROMET.M.P-K1.a for nominal pressures 1 Pa, 3 Pa, 10 Pa, 100 Pa, 300 Pa, and 1000 Pa**

**CCM.P-K4, EUROMET.M.P-K1.a, EUROMET.M.P-K1.b and SIM-EUROMET.M.P-BK3 at a pressure close to 1 Pa**

This file covers the results of participants in key comparisons CCM.P-K4 and EUROMET.M.P-K1.a linked for 7 nominal pressures in the range 1 Pa to 1000 Pa.

Additional link is carried out with the results of participants in key comparisons EUROMET.M.P-K1.b and SIM-EUROMET.M.P-BK3 for a pressure close to 1 Pa.

Results obtained in the framework of key comparisons EUROMET.M.P-K1.b and SIM-EUROMET.M.P-BK3 for the pressure range 0.3 mPa to 0.9 Pa are available from the KCDB Website by clicking on [EUROMET.M.P-K1.b](#) or [SIM-EUROMET.M.P-BK3](#).

### Key comparison CCM.P-K4

**MEASURAND:** Pressure

**NOMINAL VALUES:** 1 Pa, 3 Pa, 10 Pa, 30 Pa, 100 Pa, 300 Pa and 1000 Pa

$p_i$ : corrected mean gauge reading obtained by laboratory  $i$  (see CCM.P-K4 Final Report, page 15)

$u_i$ : combined standard uncertainty of  $p_i$  (see CCM.P-K4 Final Report, page 22)

Lab $i$	Nominal pressure / Pa	$p_i$ / Pa	$u_i$ / Pa	Measurement method	Date of measurement
CSIRO-NML	1	1.211	0.023	Liquid-Column Manometer	24 Feb 1999 to 3 Mar 1999
	3	3.301	0.025		
	10	10.566	0.046		
	30	30.906	0.069		
	100	100.831	0.093		
	300	300.57	0.16		
	1000	1000.33	0.16		
CNR-IMGC	1	1.0023	0.0031	Static Expansion System	19 Jan 1999 to 8 Feb 1999
	3	3.0042	0.0091		
	10	10.015	0.030		
	30	30.057	0.091	Liquid-Column Manometer	
	100	100.176	0.051		
	300	300.132	0.060		
KRISS	1000	1000.178	0.061	Liquid-Column Manometer	15 Jun 1999 to 22 Jun 1999
	10	10.003	0.013		
	30	30.022	0.014		
	100	100.036	0.021		
	300	300.010	0.023		
	1000	1000.056	0.055		

Lab <i>i</i>	Nominal pressure / Pa	$p_i$ / Pa	$u_i$ / Pa	Measurement method	Date of measurement
NIST	1	1.0003	0.0010	Liquid-Column Manometer(s)	17 Mar to 03 Apr and 08 Jul to 24 Jul 1998, 23 Apr to 06 May and 23 Aug to 10 Sep 1999
	3	3.0008	0.0015		
	10	9.9997	0.0018		
	30	29.9898	0.0026		
	100	99.9909	0.0053		
	300	299.9871	0.0054		
	1000	1000.0308	0.0059		
NPLI	1	0.9952	0.0010	Static Expansion System	01 Jan 1999 to 14 Jan 1999
	3	2.9929	0.0019		
	10	9.9817	0.0058		
	30	29.953	0.017		
	100	99.874	0.055		
	300	299.76	0.16		
	1000	999.12	0.74		
NPL	1	1.0013	0.0031	Static Expansion System	17 Nov 1998 to 25 Nov 1998
	3	3.0008	0.0091		
	10	10.003	0.030		
	30	29.966	0.057		
	100	99.92	0.18		
	300	299.80	0.54		
	1000	1000.7	1.8		
PTB	1	1.0002	0.0015	Static Expansion System	28 May 1998 to 04 Jun 1998
	3	2.9987	0.0038		
	10	9.995	0.013		
	30	30.002	0.033		
	100	100.00	0.11		
	300	299.92	0.32		
	1000	999.7	1.1		

**CCM.P-K4 and EUROMET.M.P-K1.a for nominal pressures 1 Pa, 3 Pa, 10 Pa, 100 Pa, 300 Pa, and 1000 Pa  
CCM.P-K4, EUROMET.M.P-K1.a, EUROMET.M.P-K1.b and SIM-EUROMET.M.P-BK3 at a pressure close to 1 Pa**

**Key comparison EUROMET.M.P-K1.a**

**MEASURAND: Pressure**

**NOMINAL VALUES: 1 Pa, 3 Pa, 10 Pa, 30 Pa, 100 Pa, 300 Pa and 1000 Pa**

The laboratory individual measurements of the participants in the key comparison EUROMET.M.P-K1.a are given in Table 7 and 8 on pages 17, 18 and 19 of the EUROMET.M.P-K1.a Final Report.

All measurements used a Static Expansion System and were carried out between September 1998 and April 2004.

**Key comparison EUROMET.M.P-K1.b**

**MEASURAND: Pressure**

**NOMINAL VALUE: 0.9 Pa**

$p_i$  pressure measurement carried out at laboratory  $i$

$u_i$  standard uncertainty of laboratory  $i$

(values taken from Table 13 of the EUROMET.M.P-K1.b Final Report)

Lab $i$	$p_i$ / Pa	$u_i$ / Pa	Date of measurement
NPL	9.004E-01	2.6E-03	May 2000
BNM-LNE	9.000E-01	5.1E-03	Jun 2000
MIRS/IMT	9.059E-01	2.7E-03	Sep 2000
CNR-IMGC	9.016E-01	2.3E-03	Oct 2000 to Nov 2000
CEM	9.021E-01	6.4E-03	Apr 2001
UME	8.988E-01	2.5E-03	Dec 2001 to Jan 2002
PTB	8.994E-01	1.7E-03	Apr 2000 - Jul 2000 - Mar 2001 - Nov 2001 - Feb 2002

CCM.P-K4 and EUROMET.M.P-K1.a for nominal pressures 1 Pa, 3 Pa, 10 Pa, 100 Pa, 300 Pa, and 1000 Pa  
CCM.P-K4, EUROMET.M.P-K1.a, EUROMET.M.P-K1.b and SIM-EUROMET.M.P-BK3 at a pressure close to 1 Pa

### Key comparison SIM-EUROMET.M.P-BK3

MEASURAND: Pressure  
NOMINAL VALUE: 0.9 Pa

$d$  relative difference between the pressures  $p_{\text{CENAM}}$  and  $p_{\text{PTB}}$ :  $d = [p_{\text{CENAM}} / p_{\text{PTB}}] - 1$   
 $U$  expanded uncertainty  $k = 2$  of  $d$

(values taken from Table 11 of the SIM-EUROMET.M.P-BK3 Final Report)

Date of measurement: April 2002 to June 2002

Nominal pressure	$d$	$U$
0.9 Pa	-0.0018	0.0041

CCM.P-K4 and EUROMET.M.P-K1.a for nominal pressures 1 Pa, 3 Pa, 10 Pa, 100 Pa, 300 Pa, and 1000 Pa  
 CCM.P-K4, EUROMET.M.P-K1.a, EUROMET.M.P-K1.b and SIM-EUROMET.M.P-BK3 at a pressure close to 1 Pa

### Key comparison CCM.P-K4

NOMINAL VALUES: 1 Pa, 3 Pa, 10 Pa, 30 Pa, 100 Pa, 300 Pa and 1000 Pa

For each nominal pressure value, the key comparison reference value,  $p_R$ , is obtained from an unweighted mean of the measurement method means. Outliers at pressures up to and including 100 Pa are excluded.

A correction is applied to set  $p_R$  numerically equal to the nominal pressure (see CCM.P-K4 Final Report, page 41).

The combined standard uncertainty of  $p_R$  is  $u_R$  (see CCM.P-K4 Final Report, page 42).

Nominal pressure / Pa	1	3	10	30	100	300	1000
$p_R$ / Pa	1	3	10	30	100	300	1000
$u_R$ / Pa	0.0008	0.0019	0.0066	0.015	0.038	0.11	0.37

The degree of equivalence of each laboratory with respect to the reference value is given by a pair of terms:  
 $D_i = (p_i - p_R)$  and  $U_i$ , its expanded uncertainty at a 95% level of confidence, both expressed in Pa.

The degree of equivalence between two laboratories is given by a pair of terms:

$D_{ij} = D_i - D_j = (p_i - p_j)$  and  $U_{ij}$ , its expanded uncertainty at a 95% level of confidence, both expressed in Pa.

### Linking EUROMET.M.P-K1.a to CCM.P-K4

The results of EUROMET.M.P-K1.a are linked to those of CCM.P-K4 for 7 pressure nominal values in the range 1 Pa to 1000 Pa, through the common participation of three laboratories: CNR-IMGC, PTB, and NPL. The CNR-IMGC, however, does not participate in the linking process in the pressure range 100 Pa to 1000 Pa, because it did not use a Static Expansion System for that range of measurements in CCM.P-K4. The detailed calculation used in the linking process is presented on pages 20 and 21 of the EUROMET.M.P-K1.a Final Report.

The degrees of equivalence of laboratories having participated in EUROMET.M.P-K1.a only (plus those of CNR-IMGC in the range 100 Pa to 1000 Pa) relative to the CCM.P-K4 key comparison reference values are obtained from the linking process and are given in Table 11 on page 22 of the EUROMET.M.P-K1.a Final Report.

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a.

## Key comparison EUROMET.M.P-K1.b

NOMINAL PRESSURE: 0.9 Pa

The key comparison reference value,  $p_{R-EUR}$ , is computed as the weighted average of the results of the BNM-LNE, CNR-IMGC, NPL, PTB and UME. The weights are inversely proportional to the square of the individual uncertainties  $u_i$ . The standard uncertainty,  $u_{R-EUR}$ , of  $p_{R-EUR}$  is the standard uncertainty of the weighted average.  
 $p_{R-EUR} = 9.000E-01$  Pa and  $u_{R-EUR} = 1.1E-03$  Pa.

The EUROMET degree of equivalence of each laboratory participant in EUROMET.M.P.K1. b with respect to the reference value  $p_{R-EUR}$  is given by a pair of terms:  $D_{i-EUR} = [(p_i / p_{R-EUR}) - 1]$  and  $U_{i-EUR}$ , its expanded uncertainty ( $k = 2$ ) computed according to Equations 29 and 30 on page 29 of the EUROMET.M.P-K1.b Final report.  $D_{i-EUR}$  and  $U_{i-EUR}$  are dimensionless.

	$D_{i-EUR}$	$U_{i-EUR}$
NPL	0.0005	0.0052
BNM-LNE	0.0000	0.011
MIRS/IMT	0.0065	0.0063
CNR-IMGC	0.0018	0.0044
CEM	0.0023	0.014
UME	-0.0013	0.0051
PTB	-0.0006	0.0029

No pair-wise degrees of equivalence are computed for the key comparison EUROMET.M.P-K1.b.

## Linking EUROMET.M.P-K1.b to CCM.P-K4

Taking into account the nominal pressure ranges involved in the key comparisons CCM.P-K4 and EUROMET.M.P-K1.b, the linkage between both can be computed only for a pressure close to 1 Pa.

For a nominal pressure close to 1 Pa, three laboratories, CNR-IMGC, NPL and PTB, are common participants to both comparisons. Examination of their performance in both comparisons leads to the conclusions (see Section 12 of the EUROMET.M.P-K1.b Final Report) that the CCM.P-K4 key comparison reference value and the EUROMET reference value are in agreement. The EUROMET degrees of equivalence relative to the reference value may thus be transferred to CCM.P-K4.

The CCM.P-K4 degrees of equivalence,  $D_i$  and  $U_i$ , are expressed in Pa, while the EUROMET.M.P-K1.b ones,  $D_{i-EUR}$  and  $U_{i-EUR}$ , are expressed in relative terms. The transfer to CCM.P-K4 is thus obtained by multiplying by  $p_{R-EUR}$  the  $D_{i-EUR}$  and  $U_{i-EUR}$  values. It follows that at a nominal pressure of 1 Pa,  $D_i = (D_{i-EUR} \times p_{R-EUR})$  and  $U_i = (U_{i-EUR} \times p_{R-EUR})$  for participants taking part only in EUROMET.M.P-K1.b.

The CCM.P-K4 graph of equivalence can thus be extended to include the BNM-LNE, MIRS/IMT, CEM and UME results.

## Linking SIM-EUROMET.M.P-BK3 to EUROMET.M.P-K1.b

The stability of the PTB primary standard between both comparisons was substantiated by the same check standard. It follows it is possible to link the CENAM value to the EUROMET.M.P-K1.b reference value  $p_{R-EUR}$  via the PTB primary standard.

By multiplying the ratio  $r = (d + 1)$  with the pressure  $p_{PTB}$  obtained during EUROMET.M.P-K1.b, one obtains a fictive value for the pressure  $p_{CENAM}$  which can be compared with the EUROMET reference value  $p_{R-EUR}$ :

$p_{CENAM} = r p_{PTB}$  with the uncertainty  $u_{CENAM}$  given in Equation 27 of the SIM-EUROMET.M.P-BK3 Final Report.

The degrees of equivalence of CENAM relative to the EUROMET.M.P-K1.b reference value is then computed from  $p_{CENAM}$  and  $u_{CENAM}$ , as if CENAM had participated in EUROMET.M.P-K1.b.

At a nominal pressure close to 1 Pa:

$p_{CENAM}$ / Pa	$u_{CENAM}$ / Pa	$D_{CENAM-EUR}$	$U_{CENAM-EUR}$
8.978E-01	1.063E-03	-0.0024	0.003

No pair-wise degrees of equivalence involving CENAM are computed.

## Linking SIM-EUROMET.M.P-BK3 to CCM.P-K4

The conclusions of the linkage between EUROMET.M.P-K1.b and CCM.P-K4 for a nominal pressure of 1 Pa apply to the results of CENAM.

It follows that at a nominal pressure of 1 Pa,  $D_{CENAM} = (D_{CENAM-EUR} \times p_{R-EUR})$  and  $U_{CENAM} = (U_{CENAM-EUR} \times p_{R-EUR})$ . The CCM.P-K4 graph of equivalence can thus be extended to include the CENAM results.

CCM.P-K4, EUROMET.M.P-K1.a, EUROMET.M.P-K1.b and SIM-EUROMET.M.P-BK3

MEASURAND: Pressure  
 NOMINAL PRESSURE: 1 Pa

Lab *i* ↓                      Lab *j* →

Participants in CCM.P-K4

	$D_i$ $U_i$		CSIRO-NML		CNR-IMGC		NIST		NPLI		NPL		PTB	
	/ Pa		$D_{ij}$ $U_{ij}$		$D_{ij}$ $U_{ij}$		$D_{ij}$ $U_{ij}$		$D_{ij}$ $U_{ij}$		$D_{ij}$ $U_{ij}$		$D_{ij}$ $U_{ij}$	
CSIRO-NML	0.211	0.046			0.209	0.046	0.211	0.046	0.216	0.046	0.210	0.046	0.211	0.046
CNR-IMGC	0.0023	0.0054	-0.209	0.046			0.0021	0.0064	0.0071	0.0063	0.0011	0.0085	0.0022	0.0067
NIST	0.0003	0.0015	-0.211	0.046	-0.0021	0.0064			0.0051	0.0028	-0.0010	0.0063	0.0001	0.0035
NPLI	-0.0048	0.0023	-0.216	0.046	-0.0071	0.0063	-0.0051	0.0028			-0.0061	0.0063	-0.0050	0.0035
NPL	0.0013	0.0054	-0.210	0.046	-0.0011	0.0085	0.0010	0.0063	0.0061	0.0063			0.0011	0.0066
PTB	0.0002	0.0029	-0.211	0.046	-0.0022	0.0067	-0.0001	0.0035	0.0050	0.0035	-0.0011	0.0066		

Participants in EUROMET.M.P-K1.b

BNM-LNE	0.0000	0.010
MIRS/IMT	0.0059	0.0057
CEM	0.0021	0.013
UME	-0.0012	0.0046

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.b.

Participant in SIM-EUROMET.M.P-BK3

CENAM	-0.0022	0.003
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No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison SIM-EUROMET.M.P-BK3.

Participants in EUROMET.M.P-K1.a

BNM-LNE	-0.0056	0.0051
MIKES	0.039	0.044
SP	0.0028	0.038
CEM	0.0031	0.0090
OMH	0.00082	0.082
UME	0.0062	0.0060
NMi-VSL	0.0036	0.035

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a.

CCM.P-K4 and EUROMET.M.P-K1.a

MEASURAND: Pressure

NOMINAL PRESSURE: 3 Pa

Lab <i>i</i> ↓	<i>D<sub>i</sub></i> <i>U<sub>i</sub></i>		Lab <i>j</i> →											
	/ Pa		CSIRO-NML		CNR-IMGC		NIST		NPLI		NPL		PTB	
	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>
CSIRO-NML	0.301	0.052			0.297	0.054	0.300	0.052	0.308	0.052	0.300	0.054	0.302	0.052
CNR-IMGC	0.004	0.016	-0.297	0.054			0.003	0.018	0.011	0.018	0.003	0.025	0.006	0.019
NIST	0.0008	0.0037	-0.300	0.052	-0.003	0.018			0.0079	0.0048	0.000	0.018	0.0022	0.0081
NPLI	-0.0071	0.0049	-0.308	0.052	-0.011	0.018	-0.0079	0.0048			-0.008	0.018	-0.0057	0.0084
NPL	0.001	0.016	-0.300	0.054	-0.003	0.025	0.000	0.018	0.008	0.018			0.002	0.019
PTB	-0.0013	0.0075	-0.302	0.052	-0.006	0.019	-0.0022	0.0081	0.0057	0.0084	-0.002	0.019		

BNM-LNE	-0.017	0.013
MIKES	0.041	0.052
SP	0.0056	0.068
CEM	0.0020	0.024
OMH	-0.093	0.23
UME	0.018	0.018
NMi-VSL	-0.033	0.036

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a.

NOMINAL PRESSURE: 10 Pa

Lab <i>i</i> ↓	<i>D<sub>i</sub></i> <i>U<sub>i</sub></i>		Lab <i>j</i> →													
	/ Pa		CSIRO-NML		CNR-IMGC		KRISS		NIST		NPLI		NPL		PTB	
	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>
CSIRO-NML	0.57	0.10			0.55	0.11	0.56	0.10	0.57	0.10	0.58	0.10	0.56	0.11	0.57	0.10
CNR-IMGC	0.015	0.053	-0.55	0.11			0.012	0.065	0.015	0.060	0.033	0.061	0.012	0.084	0.020	0.064
KRISS	0.003	0.023	-0.56	0.10	-0.012	0.065			0.003	0.027	0.021	0.029	0.000	0.065	0.008	0.036
NIST	0.000	0.013	-0.57	0.10	-0.015	0.060	-0.003	0.027			0.018	0.012	-0.003	0.059	0.005	0.025
NPLI	-0.018	0.016	-0.58	0.10	-0.033	0.061	-0.021	0.029	-0.018	0.012			-0.021	0.060	-0.013	0.027
NPL	0.003	0.053	-0.56	0.11	-0.012	0.084	0.000	0.065	0.003	0.059	0.021	0.060			0.008	0.064
PTB	-0.005	0.025	-0.57	0.10	-0.020	0.064	-0.008	0.036	-0.005	0.025	0.013	0.027	-0.008	0.064		

BNM-LNE	-0.040	0.041
MIKES	0.043	0.082
SP	-0.0080	0.13
CEM	-0.0072	0.079
OMH	-0.40	0.92
UME	0.051	0.058
NMi-VSL	0.0058	0.037

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a.

# CCM.P-K4 and EUROMET.M.P-K1.a

NOMINAL PRESSURE: 30 Pa

Lab <i>i</i>	<i>D<sub>i</sub></i> / Pa		<i>U<sub>i</sub></i>		Lab <i>j</i>													
	<i>D<sub>ij</sub></i> / Pa	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i> / Pa	<i>U<sub>ij</sub></i>	CSIRO-NML		CNR-IMGC		KRISS		NIST		NPLI		NPL		PTB	
CSIRO-NML	0.91	0.15					0.85	0.23	0.88	0.15	0.92	0.15	0.95	0.15	0.94	0.18	0.90	0.16
CNR-IMGC	0.06	0.16	-0.85	0.23					0.03	0.18	0.07	0.18	0.10	0.18	0.09	0.21	0.06	0.19
KRISS	0.022	0.035	-0.88	0.15	-0.03	0.18					0.032	0.028	0.069	0.044	0.06	0.12	0.020	0.070
NIST	-0.010	0.029	-0.92	0.15	-0.07	0.18	-0.032	0.028					0.037	0.035	0.02	0.11	-0.012	0.064
NPLI	-0.047	0.041	-0.95	0.15	-0.10	0.18	-0.069	0.044	-0.037	0.035					-0.01	0.12	-0.049	0.072
NPL	-0.03	0.10	-0.94	0.18	-0.09	0.21	-0.06	0.12	-0.02	0.11	0.01	0.12					-0.04	0.13
PTB	0.002	0.062	-0.90	0.16	-0.06	0.19	-0.020	0.070	0.012	0.064	0.049	0.072	0.04	0.13				

BNM-LNE	-0.078	0.11
MIKES	0.050	0.20
SP	-0.055	0.32
CEM	-0.037	0.20
OMH	2.0	3.2
UME	0.11	0.14
NMi-VSL	0.064	0.042

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a.

NOMINAL PRESSURE: 100 Pa

Lab <i>i</i>	<i>D<sub>i</sub></i> / Pa		<i>U<sub>i</sub></i>		Lab <i>j</i>													
	<i>D<sub>ij</sub></i> / Pa	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i> / Pa	<i>U<sub>ij</sub></i>	CSIRO-NML		CNR-IMGC		KRISS		NIST		NPLI		NPL		PTB	
CSIRO-NML	0.83	0.20					0.65	0.21	0.79	0.19	0.84	0.19	0.96	0.21	0.91	0.40	0.83	0.28
CNR-IMGC	0.18	0.11	-0.65	0.21					0.14	0.13	0.18	0.11	0.30	0.15	0.25	0.37	0.17	0.23
KRISS	0.036	0.081	-0.79	0.19	-0.14	0.13					0.045	0.043	0.16	0.11	0.11	0.36	0.03	0.21
NIST	-0.009	0.074	-0.84	0.19	-0.18	0.11	-0.045	0.043					0.12	0.11	0.07	0.36	-0.01	0.21
NPLI	-0.13	0.11	-0.96	0.21	-0.30	0.15	-0.16	0.11	-0.12	0.11					-0.05	0.37	-0.13	0.23
NPL	-0.08	0.30	-0.91	0.40	-0.25	0.37	-0.11	0.36	-0.07	0.36	0.05	0.37					-0.08	0.42
PTB	0.00	0.19	-0.83	0.28	-0.17	0.23	-0.03	0.21	0.01	0.21	0.13	0.23	0.08	0.42				

BNM-LNE	-0.17	0.38
MIKES	0.077	0.70
SP	-0.15	0.96
CEM	-0.15	0.63
OMH	2.5	3.1
UME	0.32	0.47
NMi-VSL	0.096	0.069
CNR-IMGC	-0.080	0.40

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a.

### CCM.P-K4 and EUROMET.M.P-K1.a

NOMINAL PRESSURE: 300 Pa

Lab <i>i</i> ↓	<i>D<sub>i</sub></i> / Pa		Lab <i>j</i> →													
	<i>U<sub>i</sub></i>		CSIRO-NML		CNR-IMGC		KRISS		NIST		NPLI		NPL		PTB	
			<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>
CSIRO-NML	0.57	0.34			0.44	0.33	0.56	0.31	0.58	0.31	0.81	0.44	0.8	1.1	0.65	0.70
CNR-IMGC	0.13	0.24	-0.44	0.33			0.12	0.17	0.15	0.13	0.38	0.33	0.3	1.1	0.21	0.64
KRISS	0.01	0.22	-0.56	0.31	-0.12	0.17			0.02	0.05	0.25	0.31	0.2	1.1	0.09	0.63
NIST	-0.01	0.22	-0.58	0.31	-0.15	0.13	-0.02	0.05			0.23	0.31	0.2	1.1	0.06	0.63
NPLI	-0.24	0.33	-0.81	0.44	-0.38	0.33	-0.25	0.31	-0.23	0.31			0.0	1.1	-0.17	0.70
NPL	-0.20	0.90	-0.8	1.1	-0.3	1.1	-0.2	1.1	-0.2	1.1	0.0	1.1			-0.1	1.2
PTB	-0.08	0.56	-0.65	0.70	-0.21	0.64	-0.09	0.63	-0.06	0.63	0.17	0.70	0.1	1.2		

BNM-LNE	-0.30	0.57
MIKES	-0.10	1.3
SP	-0.30	1.3
CEM	-0.30	1.3
CNR-IMGC	0.13	0.61

No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a

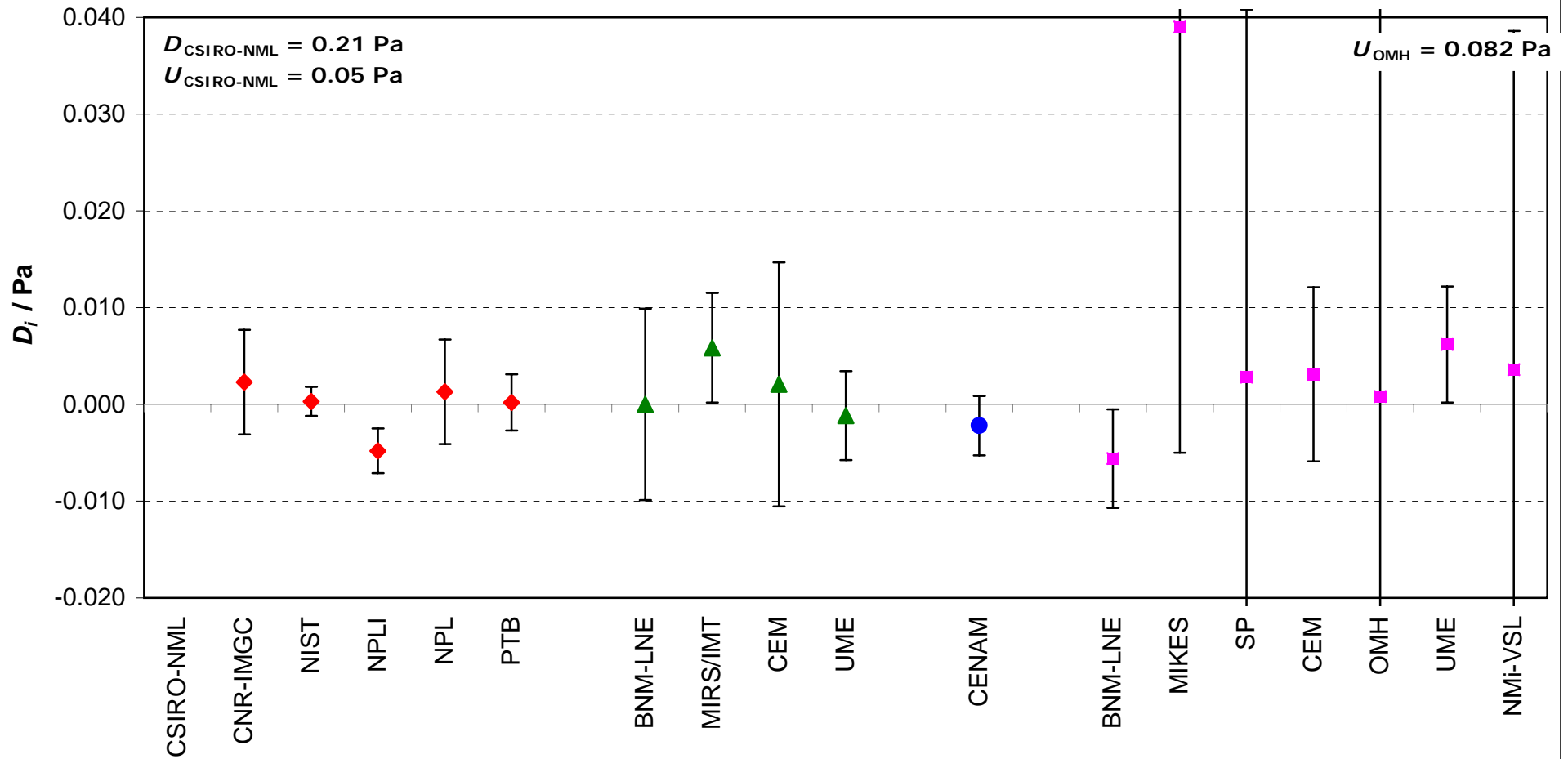
NOMINAL PRESSURE: 1000 Pa

Lab <i>i</i> ↓	<i>D<sub>i</sub></i> / Pa		Lab <i>j</i> →													
	<i>U<sub>i</sub></i>		CSIRO-NML		CNR-IMGC		KRISS		NIST		NPLI		NPL		PTB	
			<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>	<i>D<sub>ij</sub></i>	<i>U<sub>ij</sub></i>
CSIRO-NML	0.33	0.78			0.15	0.34	0.28	0.33	0.30	0.32	1.2	1.5	-0.4	3.5	0.6	2.2
CNR-IMGC	0.18	0.74	-0.15	0.34			0.12	0.18	0.15	0.13	1.1	1.5	-0.5	3.5	0.4	2.2
KRISS	0.06	0.74	-0.28	0.33	-0.12	0.18			0.03	0.11	0.9	1.5	-0.6	3.5	0.3	2.2
NIST	0.03	0.73	-0.30	0.32	-0.15	0.13	-0.03	0.11			0.9	1.5	-0.7	3.5	0.3	2.2
NPLI	-0.9	1.4	-1.2	1.5	-1.1	1.5	-0.9	1.5	-0.9	1.5			-1.6	3.8	-0.6	2.6
NPL	0.7	3.0	0.4	3.5	0.5	3.5	0.6	3.5	0.7	3.5	1.6	3.8			1.0	4.2
PTB	-0.3	1.9	-0.6	2.2	-0.4	2.2	-0.3	2.2	-0.3	2.2	0.6	2.6	-1.0	4.2		

BNM-LNE	-0.38	1.9
MIKES	0.32	4.5
SP	0.51	2.3
CEM	-0.38	4.2
CNR-IMGC	0.38	2.0

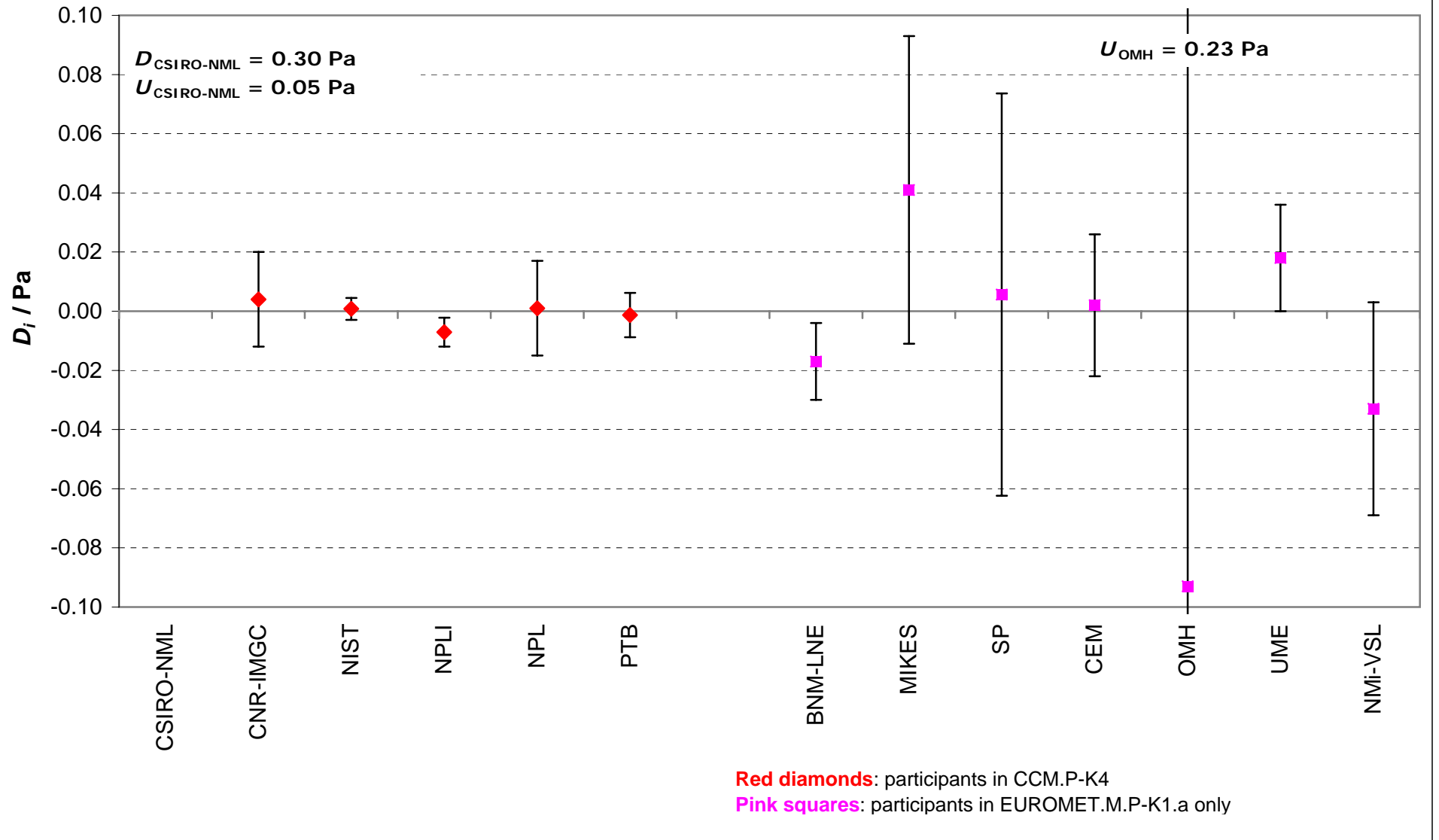
No pair-wise degrees of equivalence are deduced from the measurements carried out in the framework of key comparison EUROMET.M.P-K1.a

CCM.P-K4, EUROMET.M.P-K1.b, SIM-EUROMET.M.P.BK3, and EUROMET.M.P-K1.a, pressure ~ 1 Pa  
 Degrees of equivalence [ $D_i$  and  $U_i$  ( $k = 2$ )]

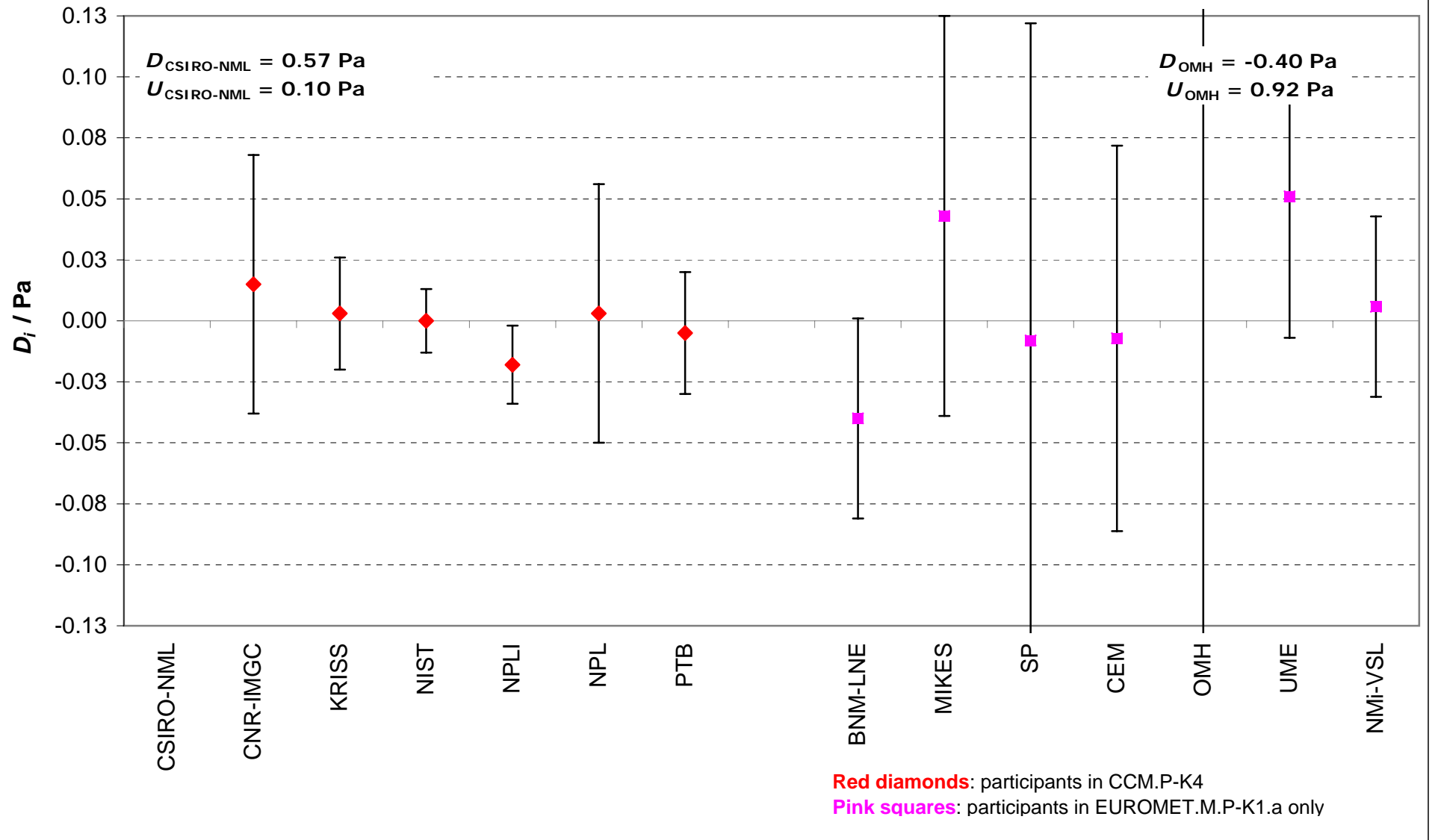


Red diamonds: participants in CCM.P-K4  
 Green triangles: participants in EUROMET.M.P-K1.b only  
 Blue circle: participant in SIM-EUROMET.M.P-BK3 only  
 Pink squares: participants in EUROMET.M.P-K1.a only

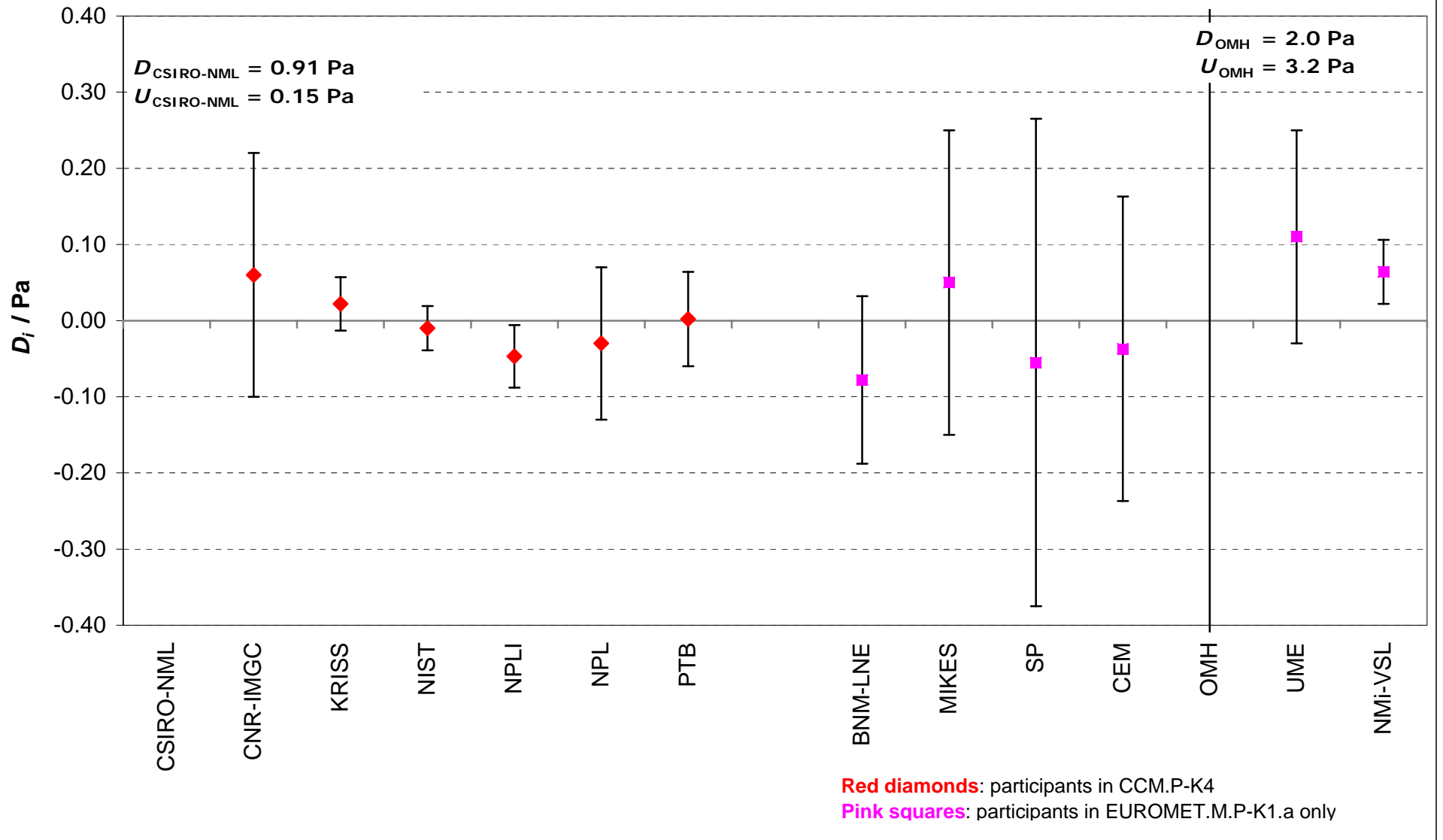
CCM.P-K4 and EUROMET.M.P-K1.a, nominal pressure 3 Pa  
 Degrees of equivalence [ $D_i$  and  $U_i$  ( $k = 2$ )]



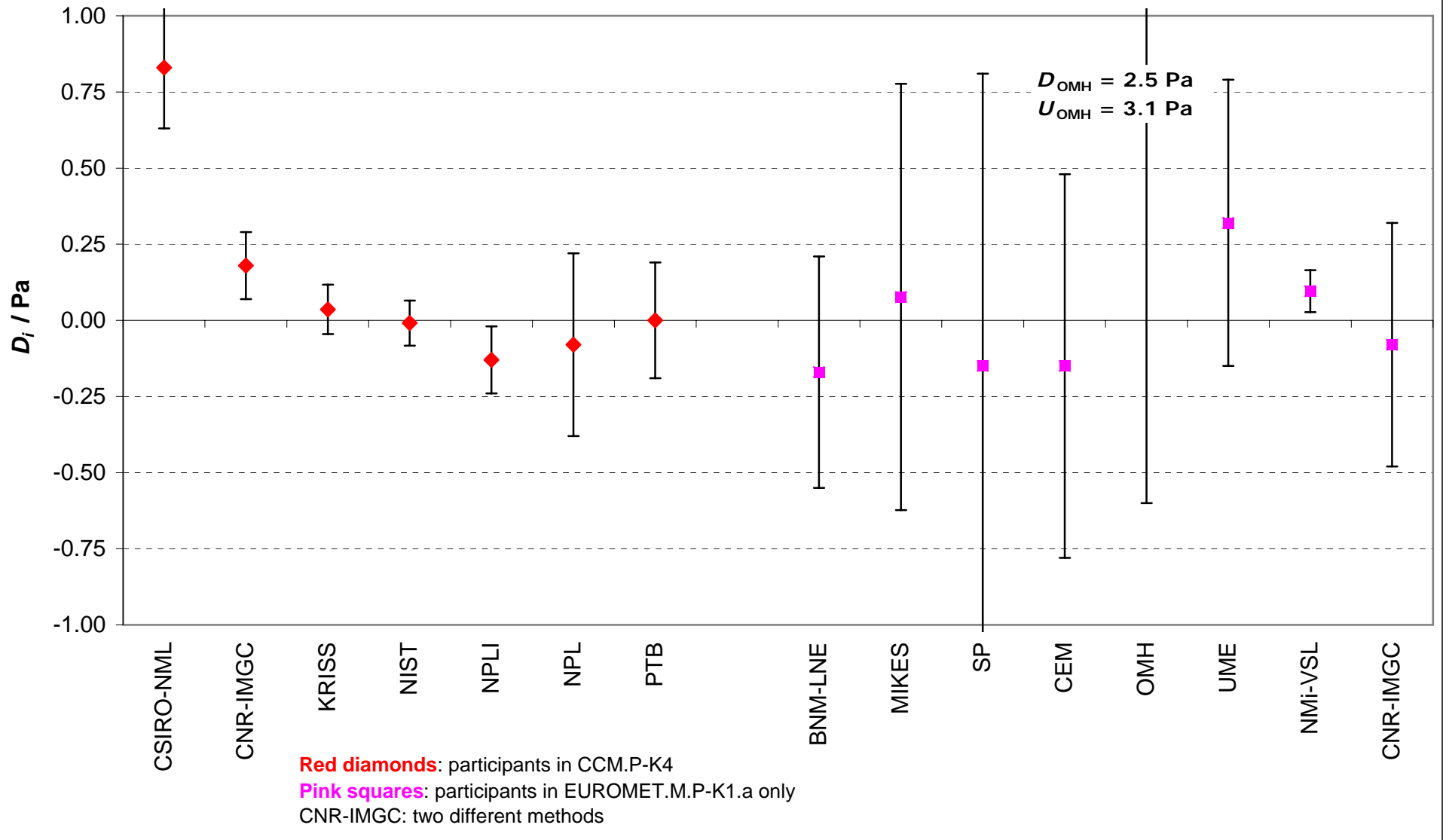
CCM.P-K4 and EUROMET.M.P-K1.a, nominal pressure 10 Pa  
 Degrees of equivalence [ $D_i$  and  $U_i$  ( $k = 2$ )]



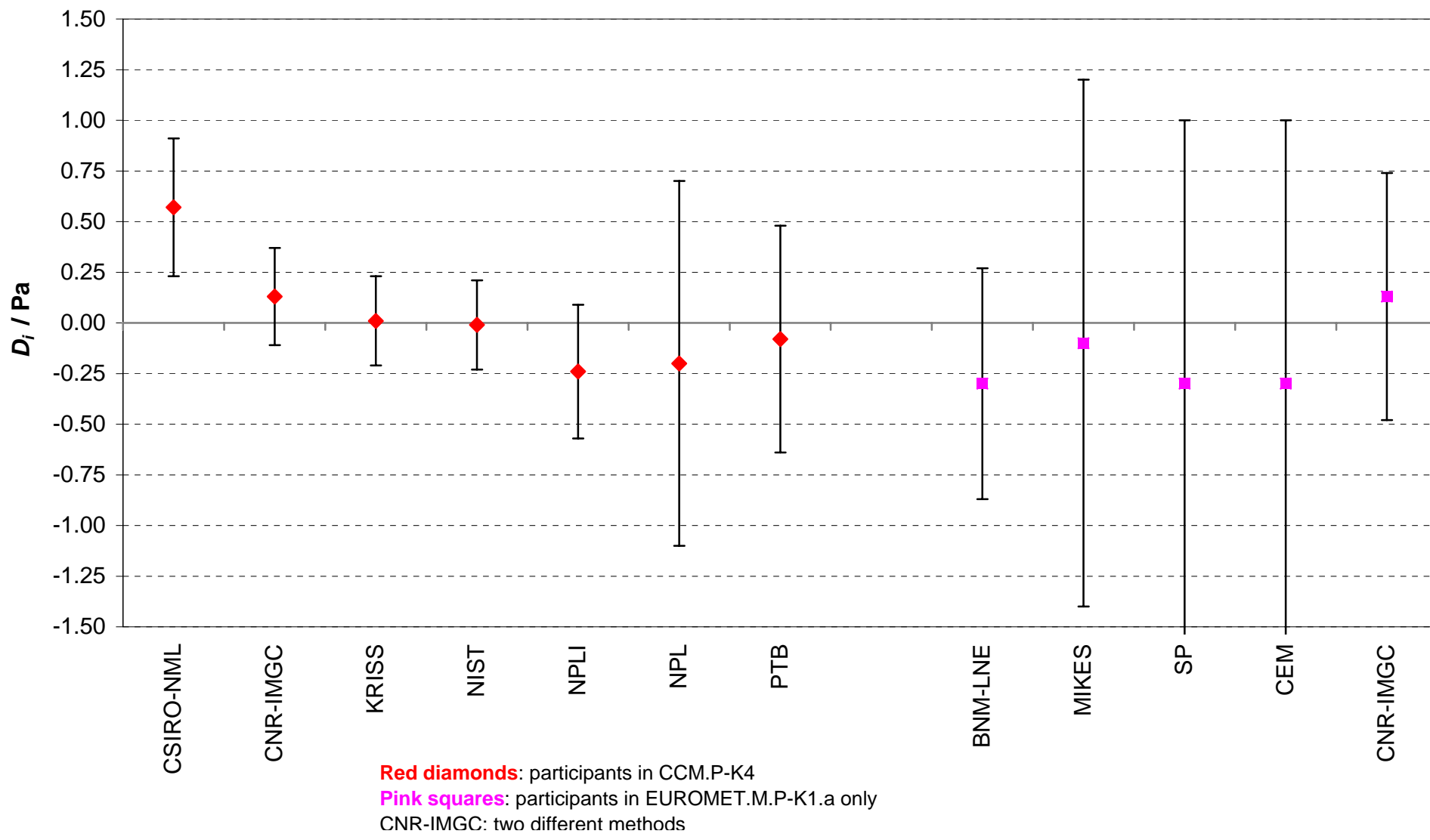
CCM.P-K4 and EUROMET.M.P-K1.a, nominal pressure 30 Pa  
 Degrees of equivalence [ $D_i$  and  $U_i$  ( $k = 2$ )]



CCM.P-K4 and EUROMET.M.P-K1.a, nominal pressure 100 Pa  
 Degrees of equivalence [ $D_i$  and  $U_i$  ( $k = 2$ )]



**CCM.P-K4 and EUROMET.M.P-K1.a, nominal pressure 300 Pa  
Degrees of equivalence [ $D_i$  and  $U_i$  ( $k = 2$ )]**



CCM.P-K4 and EUROMET.M.P-K1.a, nominal pressure 1000 Pa  
 Degrees of equivalence [ $D_i$  and  $U_i$  ( $k = 2$ )]

