Key comparison CCQM-K120

MEASURAND : **Amount of carbon dioxide in air**
NOMINAL VALUE : **380 µmol/mol**

x_i : **result of measurement carried out by laboratory *i***
$u_{\text{Lab } i}$: **standard uncertainty of x_i**
$x_{i\,\text{ref}}$: **reference value for the cylinder determined for laboratory *i***
$u_{i\,\text{ref}}$: **combined standard uncertainty of $x_{i\,\text{ref}}$**

Lab *i*	Cylinder	x_i / (µmol/mol)	$u_{\text{Lab } i}$ / (µmol/mol)	$x_{i\,\text{ref}}$ / (µmol/mol)	$u_{i\,\text{ref}}$ / (µmol/mol)
GUM	D298392	380.1	2.2	379.664	0.044
KRISS	D500642	378.9	0.1	378.828	0.055
LNE	1029045	379.48	0.395	379.253	0.051
NIM	FB03747	383.43	0.1	383.453	0.052
NMIJ	CPC00486	386.617	0.025**	386.597	0.088
NMISA	M51 8232	380.2	1	379.743	0.050
NOAA	CC310084	379.5	0.105	379.511	0.046
NPL	2179	380.27	0.095	380.269	0.041
VNIIM	M365601	380.2	0.055**	380.182	0.042
VSL	5604614	378.9	0.14	378.937	0.051
UME	PSM298266	379.92	0.095*	380.017	0.071
BFKH	OMH54	379.8	0.85	374.884	0.099
NIST	FB04278	379.045	0.195	380.088	0.042
NPLI	JJ108891	375.72	1.61	374.576	0.108

* Re-submitted value following the decision of the the CCQM GAWG
** Uncertainties below the cutoff value of 0.095 µmol/mol

Key comparison CCQM-K120

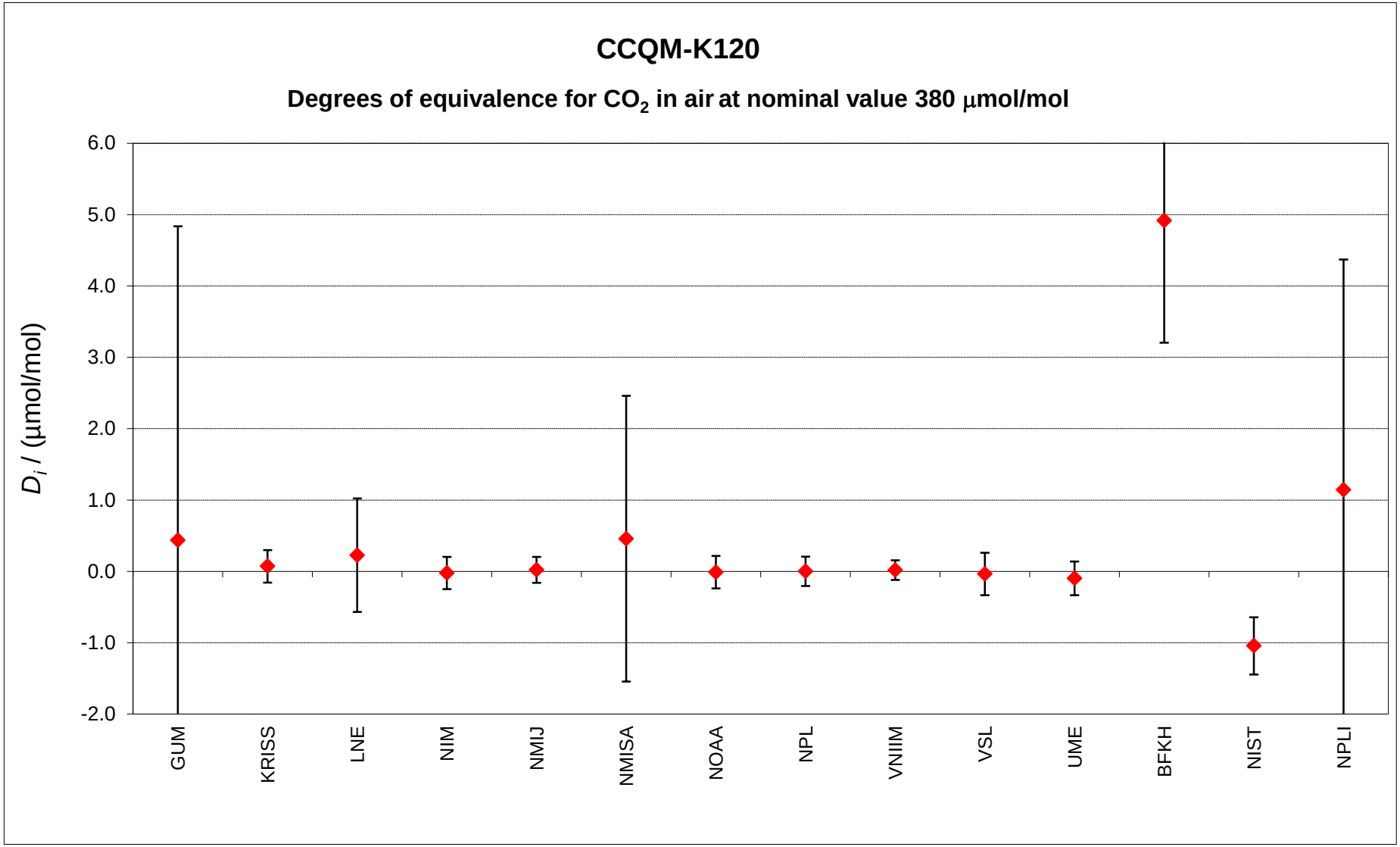
MEASURAND : **Amount of carbon dioxide in air**
NOMINAL VALUE : **380 µmol/mol**

There is no single reference value for this comparison. The Key Comparison Reference Values were obtained by applying a linear regression to a consistent set of results (excluding BFKH, NIST and NPLI). The value $x_{i\,ref}$ is taken as the Key Comparison Reference Value for laboratory *i* .

The degree of equivalence of laboratory *i* with respect to the reference value is given by a pair of terms, both expressed in µmol/mol: $D_i = (x_i - x_{i\,ref})$ and U_i, its expanded uncertainty, where $U_i = 2\,(u_{Lab\,i}^2 - u_{i\,ref}^2)^{1/2}$

Lab *i* ⇩

	D_i / (µmol/mol)	U_i / (µmol/mol)
GUM	**0.44**	4.40
KRISS	**0.07**	0.23
LNE	**0.23**	0.80
NIM	**-0.02**	0.23
NMIJ	**0.02**	0.18
NMISA	**0.46**	2.00
NOAA	**-0.01**	0.23
NPL	**0.00**	0.21
VNIIM	**0.02**	0.14
VSL	**-0.04**	0.30
UME	**-0.10**	0.24
BFKH	**4.92**	1.71
NIST	**-1.04**	0.40
NPLI	**1.14**	3.23


CCQM-K120
Degrees of equivalence for CO2 in air at nominal value 380 µmol/mol
Di / (µmol/mol)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
GUM
KRISS
LNE
NIM
NMIJ
NMISA
NOAA
NPL
VNIIM
VSL
UME
BFKH
NIST
NPLI

Key comparison CCQM-K120

MEASURAND : **Amount of carbon dioxide in air**
NOMINAL VALUE : **480 µmol/mol**

x_i : **result of measurement carried out by laboratory *i***
$u_{\text{Lab } i}$: **standard uncertainty of x_i**
$x_{i\,\text{ref}}$: **reference value for the cylinder determined for laboratory *i***
$u_{i\,\text{ref}}$: **combined standard uncertainty of $x_{i\,\text{ref}}$**

Lab *i*	Cylinder	x_i / (µmol/mol)	$u_{\text{Lab } i}$ / (µmol/mol)	$x_{i\,\text{ref}}$ / (µmol/mol)	$u_{i\,\text{ref}}$ / (µmol/mol)
GUM	D298393	478.1	2.6	477.706	0.051
INRIM	D247440	479.3	0.8	479.007	0.173
KRISS	D500647	480	0.1	479.851	0.052
LNE	1029047	477.6	0.5	477.397	0.061
NIM	FB03744	489.15	0.11	489.202	0.099
NMIJ	CPC00494	471.301	0.026**	471.351	0.094
NMISA	M51 8167	479.5	0.8	479.042	0.068
NOAA	CC305198	479.26	0.13	479.363	0.058
NPL	2170	480.02	0.12	479.985	0.049
VNIIM	M365664	480.18	0.065**	480.145	0.059
VSL	5604880	480.48	0.18	480.523	0.045
UME	PSM266468	480.42	0.125*	480.537	0.078
BFKH	OMH44	479.9	1.05	464.911	0.138
NIST	FB04300	472.662	0.214	473.529	0.071
NPLI	JJ108862	480.52	1.52	480.863	0.079

* Re-submitted value following the decision of the the CCQM GAWG
** Uncertainties below the cutoff value of 0.095 µmol/mol

Key comparison CCQM-K120

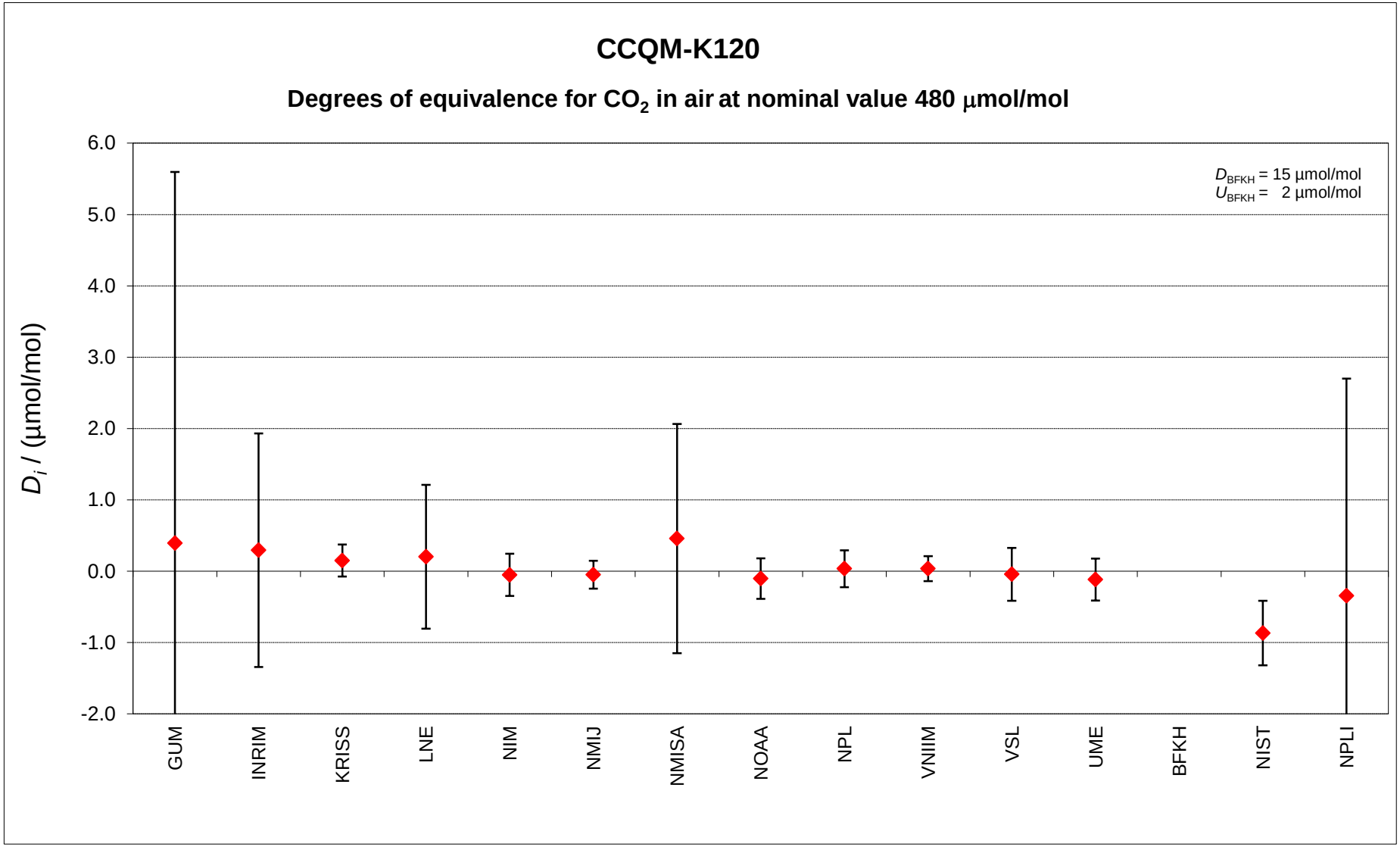
MEASURAND : **Amount of carbon dioxide in air**
NOMINAL VALUE : **480 µmol/mol**

There is no single reference value for this comparison. The Key Comparison Reference Values were obtained by applying a linear regression to a consistent set of results (excluding BFKH, NIST and NPLI). The value $x_{i\,ref}$ is taken as the Key Comparison Reference Value for laboratory *i* .

The degree of equivalence of laboratory *i* with respect to the reference value is given by a pair of terms, both expressed in µmol/mol: $D_i = (x_i - x_{i\,ref})$ and U_i, its expanded uncertainty, where $U_i = 2\,(u_{Lab\,i}^2 - u_{i\,ref}^2)^{1/2}$

Lab *i* ⇩

	D_i / (µmol/mol)	U_i / (µmol/mol)
GUM	**0.39**	5.20
INRIM	**0.29**	1.64
KRISS	**0.15**	0.23
LNE	**0.20**	1.01
NIM	**-0.05**	0.30
NMIJ	**-0.05**	0.20
NMISA	**0.46**	1.61
NOAA	**-0.10**	0.28
NPL	**0.04**	0.26
VNIIM	**0.04**	0.18
VSL	**-0.04**	0.37
UME	**-0.12**	0.30
BFKH	**14.99**	2.12
NIST	**-0.87**	0.45
NPLI	**-0.34**	3.04


CCQM-K120
Degrees of equivalence for CO_2 in air at nominal value 480 µmol/mol
D_{BFKH} = 15 µmol/mol
U_{BFKH} = 2 µmol/mol
D_i / (µmol/mol)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
GUM
INRIM
KRISS
LNE
NIM
NMIJ
NMISA
NOAA
NPL
VNIIM
VSL
UME
BFKH
NIST
NPLI

Key comparison CCQM-K120

MEASURAND : **Amount of carbon dioxide in air**
NOMINAL VALUE : **800 µmol/mol**

x_i : **result of measurement carried out by laboratory *i***
$u_{\text{Lab } i}$: **standard uncertainty of x_i**
$x_{i\,\text{ref}}$: **reference value for the cylinder determined for laboratory *i***
$u_{i\,\text{ref}}$: **combined standard uncertainty of $x_{i\,\text{ref}}$**

Lab *i*	Cylinder	x_i / (µmol/mol)	$u_{\text{Lab } i}$ / (µmol/mol)	$x_{i\,\text{ref}}$ / (µmol/mol)	$u_{i\,\text{ref}}$ / (µmol/mol)
GUM	D298402	800.5	4.3	800.105	0.106
INRIM	D247445	798.9	1.3	798.389	0.128
KRISS	D500672	800.8	0.2	800.519	0.118
LNE	1029048	802.2	0.85	802.099	0.078
NMIJ	CPC00558	803.658	0.039**	803.694	0.114
NPL	2181	799.7	0.2	799.744	0.101
NMISA	M518244	799.1	0.5	798.187	0.132
VNIIM	M365707	800.73	0.095	800.697	0.084
VSL	5604705	795.7	0.3	796.080	0.191
UME	PSM298347	800.76	0.180*	800.917	0.083
NIM	FB03748	809.82	0.13	810.424	0.327
NOAA	CB11668	794.08	0.24	794.608	0.237
BFKH	OMH69	800.3	1.45	800.282	0.100
NIST	FB04287	794.53	0.514	795.511	0.208
NPLI	JJ108854	796.38	2.515	794.501	0.239

* Re-submitted value following the decision of the the CCQM GAWG
** Uncertainties below the cutoff value of 0.095 µmol/mol

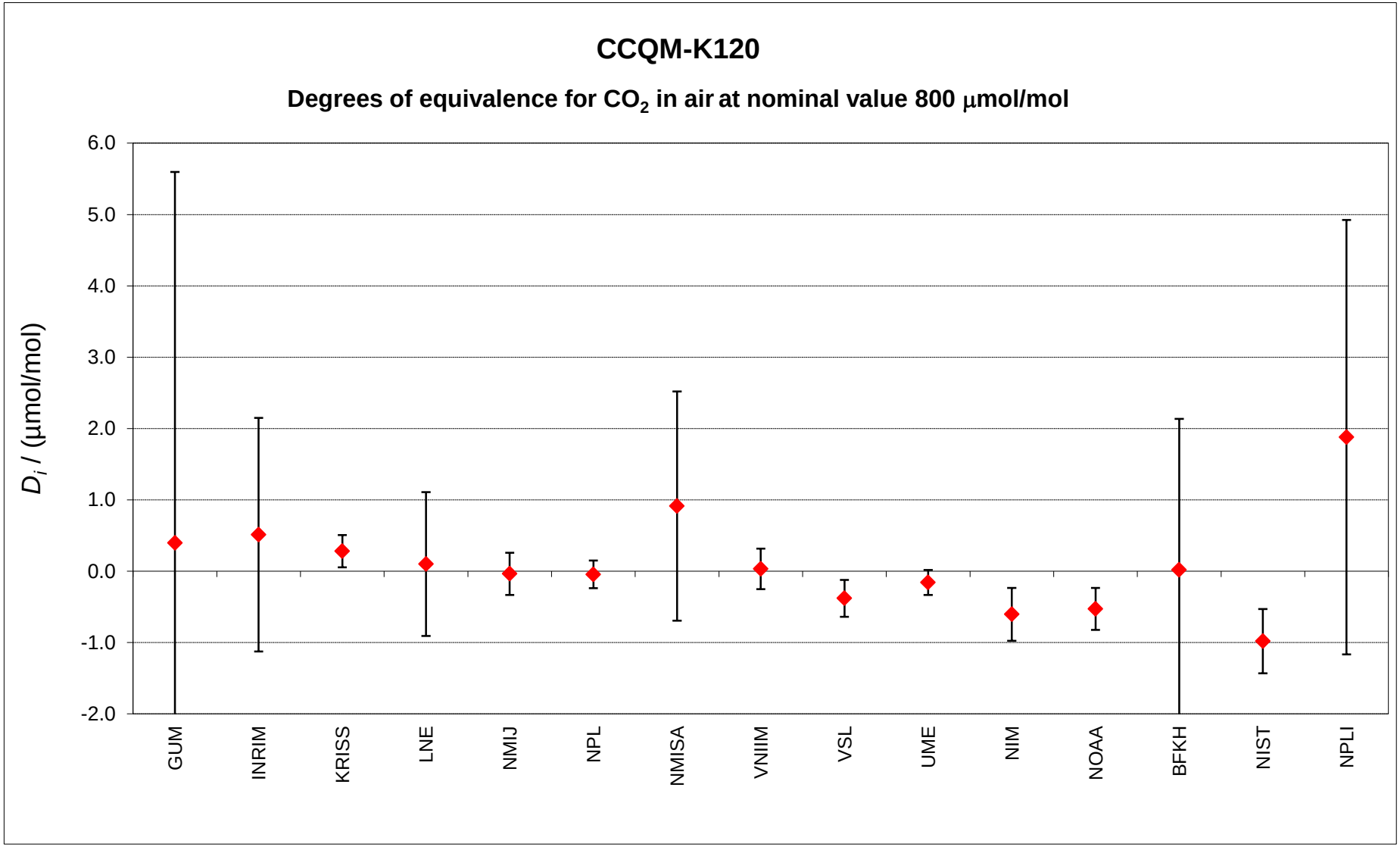
Key comparison CCQM-K120

MEASURAND : **Amount of carbon dioxide in air**
NOMINAL VALUE : **800 µmol/mol**

There is no single reference value for this comparison. The Key Comparison Reference Values were obtained by applying a linear regression to a consistent set of results (excluding BFKH, NIM, NIST, NOAA and NPLI). The value $x_{i\,ref}$ is taken as the Key Comparison Reference Value for laboratory *i* .

The degree of equivalence of laboratory *i* with respect to the reference value is given by a pair of terms, both expressed in µmol/mol: $D_i = (x_i - x_{i\,ref})$ and U_i, its expanded uncertainty, where $U_i = 2\,(u_{Lab\,i}^{\,2} - u_{i\,ref}^{\,2})^{1/2}$

Lab *i* ⇩	D_i / (µmol/mol)	U_i / (µmol/mol)
GUM	**0.40**	8.60
INRIM	**0.51**	2.61
KRISS	**0.28**	0.46
LNE	**0.10**	1.71
NMIJ	**-0.04**	0.24
NPL	**-0.04**	0.45
NMISA	**0.91**	1.03
VNIIM	**0.03**	0.25
VSL	**-0.38**	0.71
UME	**-0.16**	0.40
NIM	**-0.60**	0.70
NOAA	**-0.53**	0.67
BFKH	**0.02**	2.91
NIST	**-0.98**	1.11
NPLI	**1.88**	5.05


CCQM-K120
Degrees of equivalence for CO_2 in air at nominal value 800 μmol/mol
D_i / (μmol/mol)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
GUM
INRIM
KRISS
LNE
NMIJ
NPL
NMISA
VNIIM
VSL
UME
NIM
NOAA
BFKH
NIST
NPLI