

Key comparison EURAMET.L-K1.2

MEASURAND: Central length of steel gauge blocks measured by interferometry according to ISO 3650

NOMINAL VALUES: 8 steel gauge blocks from 1 mm to 90 mm

x_{ik} : result of measurement carried out by laboratory i for gauge block with nominal length L_k , expressed as the deviation from nominal length in nm

u_{ik} : combined standard uncertainty of x_{ik} reported by laboratory i

Nominal length L_k ($k = 1$ to 8) Lab i	1 mm		5 mm		8 mm		10 mm		25 mm		40 mm		60 mm		90 mm		Date of measurement
	x_{i1} / nm	u_{i1} / nm	x_{i2} / nm	u_{i2} / nm	x_{i3} / nm	u_{i3} / nm	x_{i4} / nm	u_{i4} / nm	x_{i5} / nm	u_{i5} / nm	x_{i6} / nm	u_{i6} / nm	x_{i7} / nm	u_{i7} / nm	x_{i8} / nm	u_{i8} / nm	
GUM	56	11	37	11	90	11	90	11	-258	14	-2	12	-354	13	147	14	Mar - Apr 2010
DFM	82.3	11.5	57.3	11.5	112.3	11.6	112.8	11.6	-254.2	12.3	23.3	13.6	-313.7	15.8	194.3	19.9	Apr - May 2010
MKEH	30	20	10	20	70	20	70	20	-250	20	20	20	-300	30	210	40	May - Jun 2010
NIS	41	16	10.5	18	50	19	54	19	-60	25	-149	30	59	36	-96	47	Jun - Jul 2010
HMI/FSB-LPMD	73	15	46	15	88	15	99	15	-253	16	14	18	-346	21	148	27	Feb - Mar 2010 and Jul 2010

Key comparison EURAMET.L-K1.2

MEASURAND: Central length of steel gauge blocks measured by interferometry according to ISO 3650

NOMINAL VALUES: 8 steel gauge blocks from 1 mm to 90 mm

For each nominal value L_k , the reference value, x_{Rk} , is obtained from the weighted mean of the participant results x_{ik} with weights based on the participants combined standard uncertainties, as explained in Chapter 8 of the Final Report.

The corresponding standard uncertainty, u_{Rk} , is based on the internal standard deviation of the measurement results (see also in Chapter 8).

Nominal length L_k \Rightarrow	1 mm	5 mm	8 mm	10 mm	25 mm	40 mm	60 mm	90 mm
x_{Rk} / nm	65.2	42.5	94.7	97	-254.4	11.5	-336	163.6
u_{Rk} / nm	6.6	6.6	6.7	6.7	7.4	7.5	8.7	10.2

For each nominal value L_k , the degree of equivalence of each laboratory i with respect to the reference value is given by a pair of terms:

$D_{ik} = x_{ik} - x_{Rk}$, and U_{ik} , its expanded uncertainty ($k = 2$), with $U_{ik} = 2[u_{ik}^2 - u_{Rk}^2]^{1/2}$.

Pair-wise degrees of equivalence are not computed for this key comparison.

NIS results were not taken into account in the calculation of the key comparison reference values and the degrees of equivalence as they suspected that certain influence parameters (possibly temperature) were not accounted for in their measurements.

Key comparison EURAMET.L-K1.2

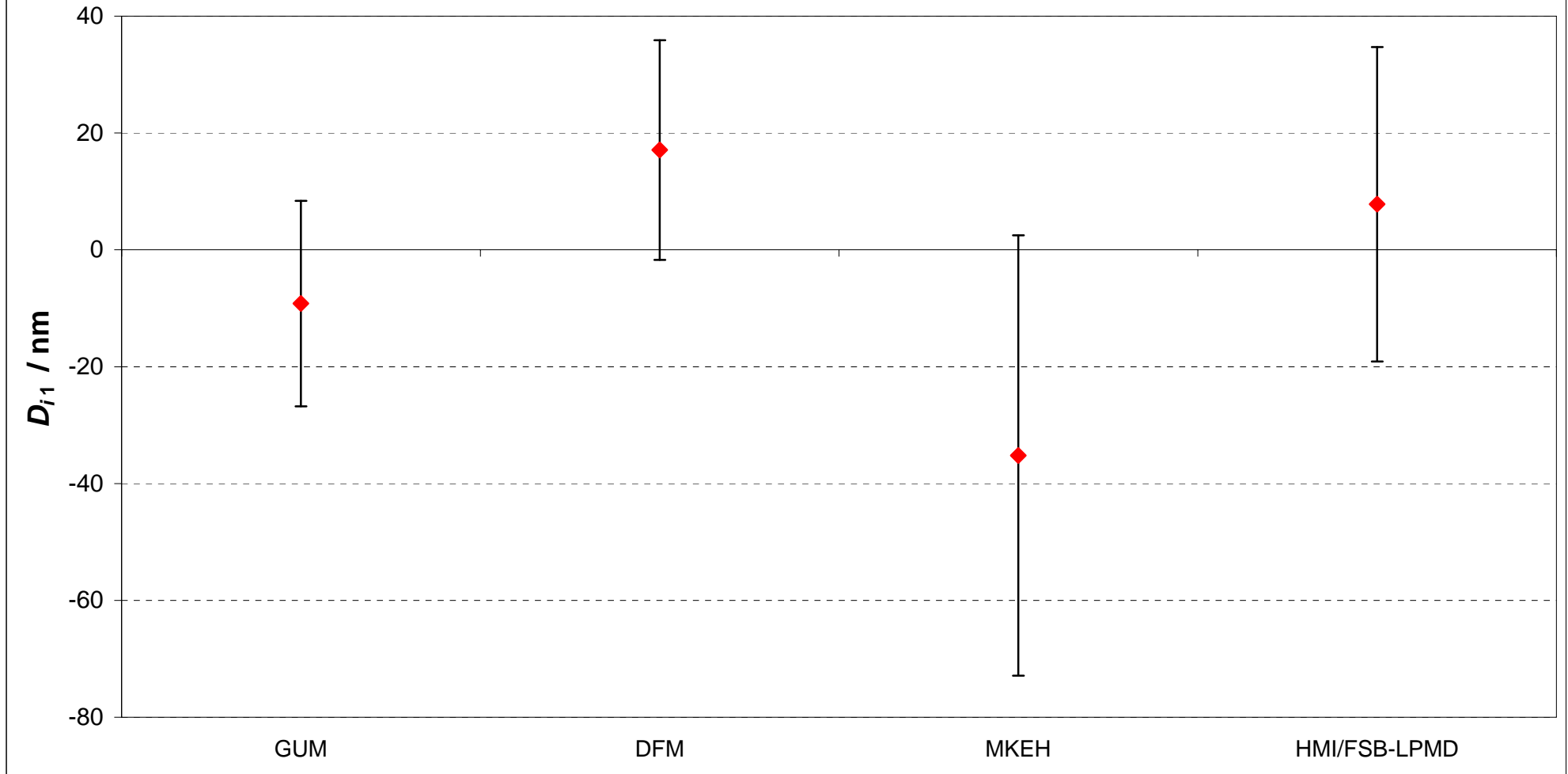
MEASURAND: Central length of steel gauge blocks measured by interferometry according to ISO 3650

NOMINAL VALUES: 8 steel gauge blocks from 1 mm to 90 mm

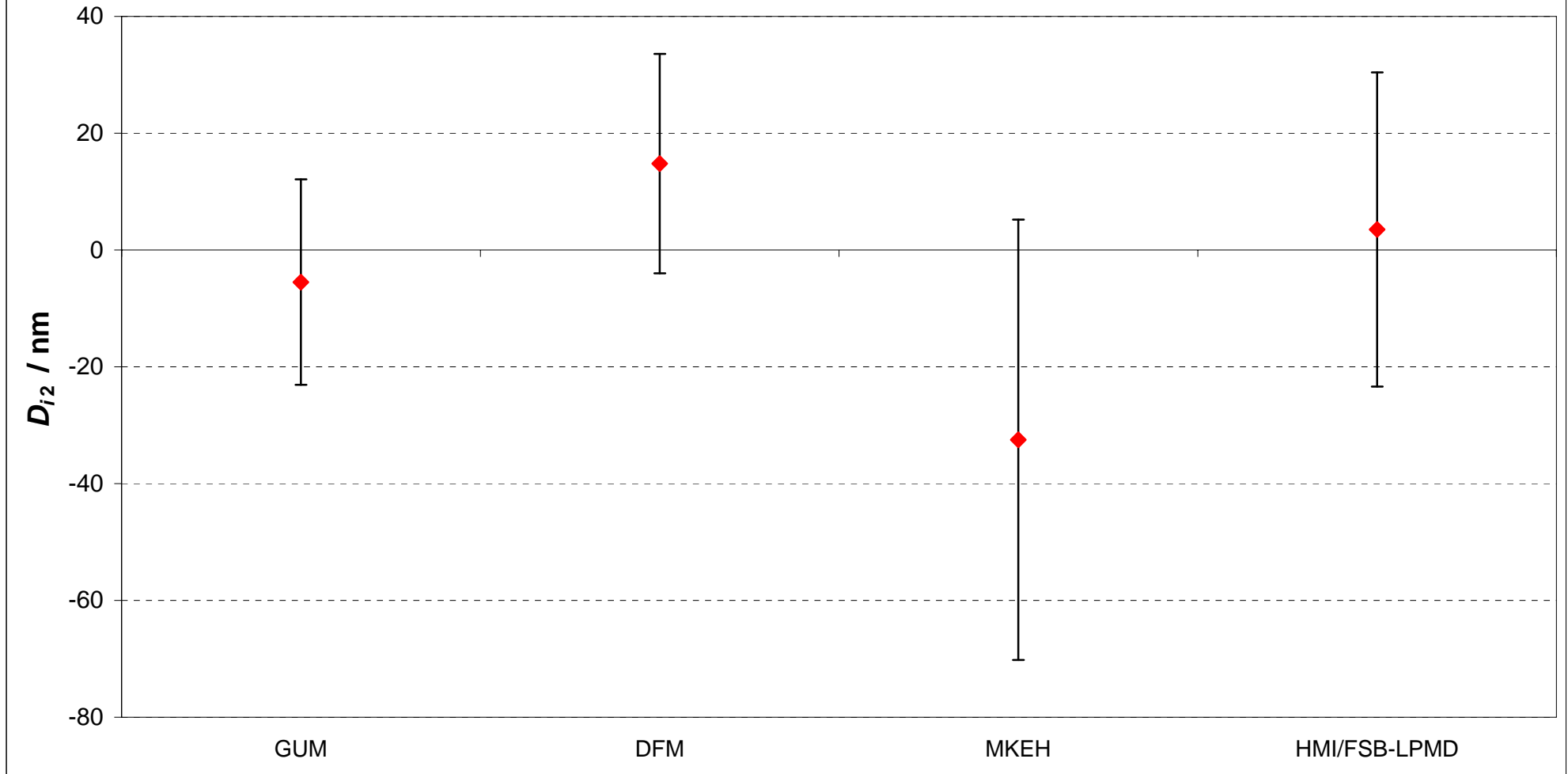
Degrees of equivalence relative to the key comparison reference value

Nominal length L_k ($k = 1$ to 8) Lab i	1 mm		5 mm		8 mm		10 mm		25 mm		40 mm		60 mm		90 mm	
	D_{i1} / nm	U_{i1} / nm	D_{i2} / nm	U_{i2} / nm	D_{i3} / nm	U_{i3} / nm	D_{i4} / nm	U_{i4} / nm	D_{i5} / nm	U_{i5} / nm	D_{i6} / nm	U_{i6} / nm	D_{i7} / nm	U_{i7} / nm	D_{i8} / nm	U_{i8} / nm
GUM	-9.2	17.6	-5.5	17.6	-4.7	17.5	-7.0	17.5	-3.6	23.7	-13.4	18.8	-18.0	19.4	-16.6	19.2
DFM	17.1	18.8	14.8	18.8	17.6	19.0	15.8	19.0	0.2	19.6	11.9	22.7	22.3	26.4	30.7	34.2
MKEH	-35.2	37.7	-32.5	37.7	-24.7	37.7	-27.0	37.7	4.4	37.1	8.6	37.1	36.0	57.4	46.4	77.4
NIS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HMI/FSB-LPMD	7.8	26.9	3.5	26.9	-6.7	26.9	2.0	26.9	1.4	28.3	2.6	32.8	-10.0	38.3	-15.6	50.0

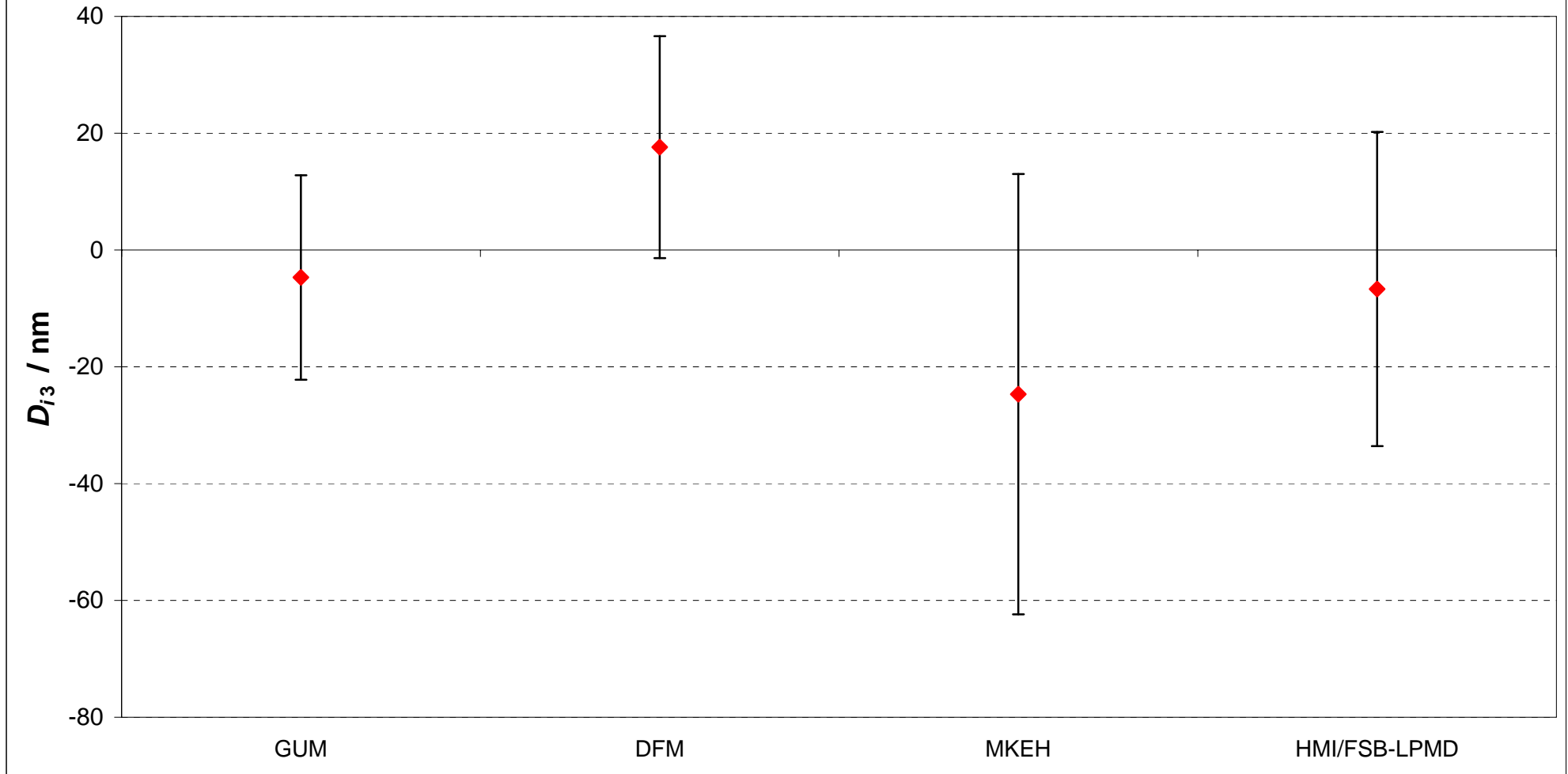
EURAMET.L-K1.2 Steel gauge block, nominal length $L_1 = 1$ mm
Degrees of equivalence: D_{i1} and expanded uncertainty U_{i1} ($k = 2$)



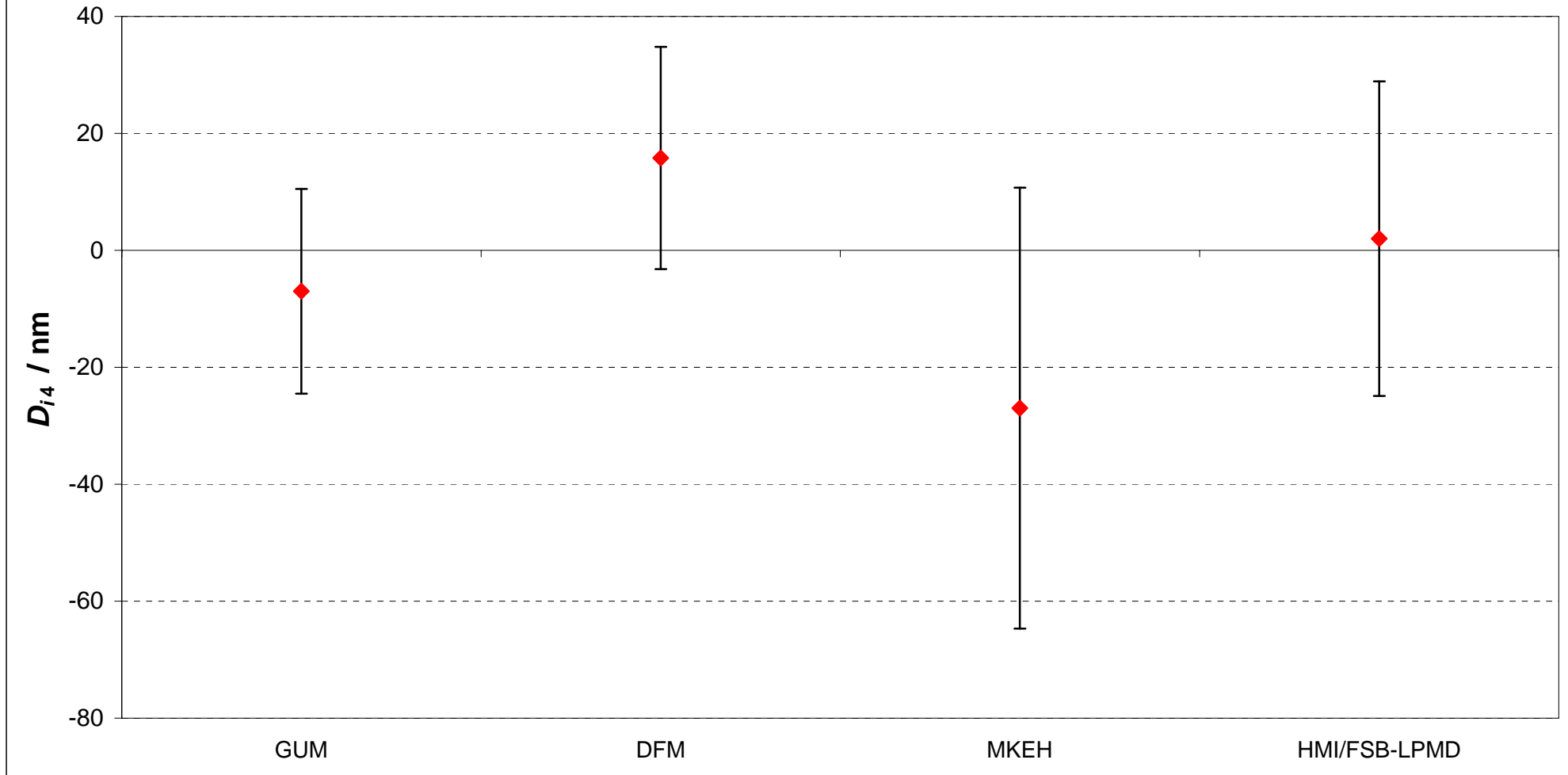
EURAMET.L-K1.2 Steel gauge block, nominal length $L_2 = 5$ mm
Degrees of equivalence: D_{i2} and expanded uncertainty U_{i2} ($k = 2$)



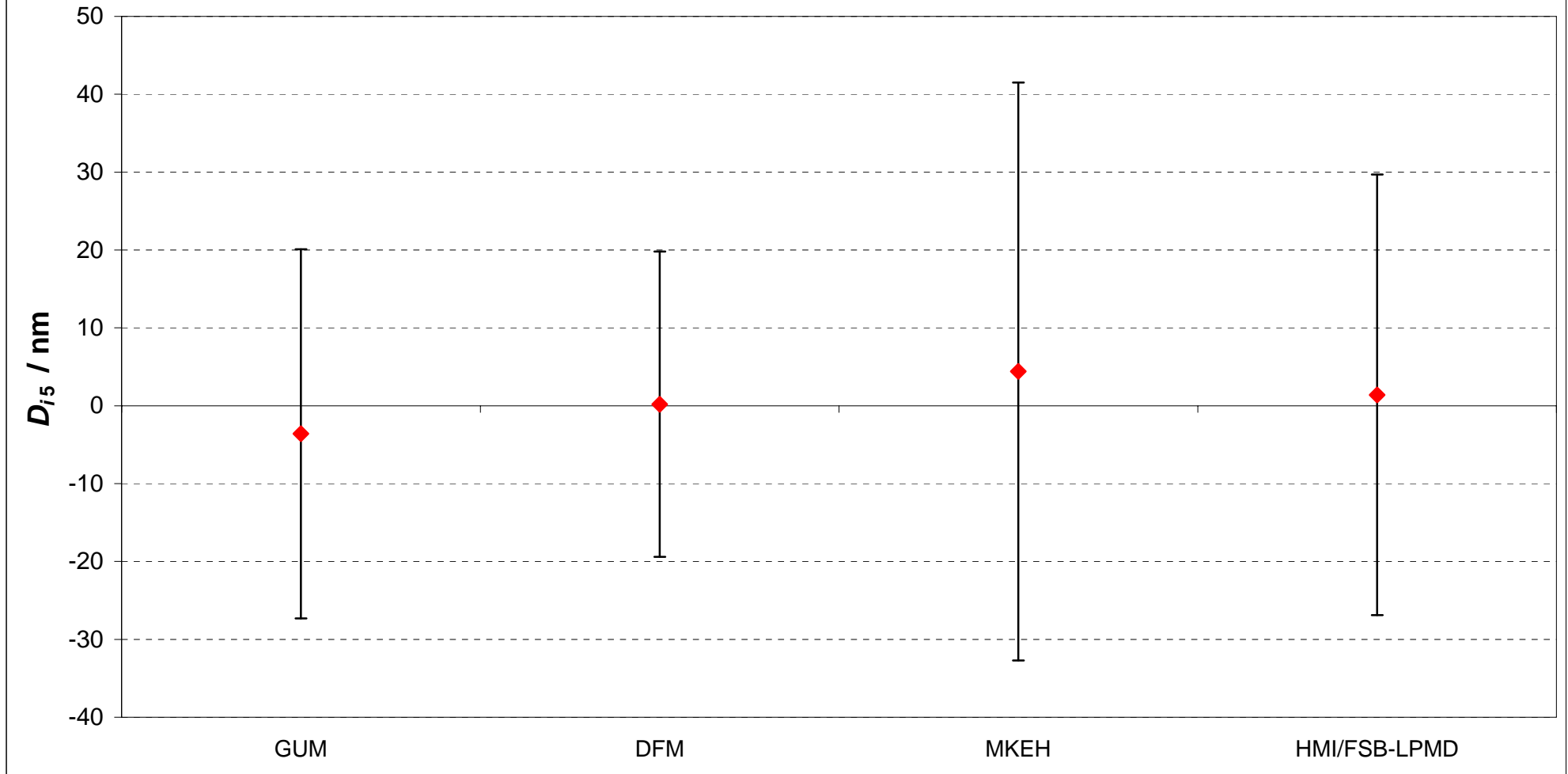
EURAMET.L-K1.2 Steel gauge block, nominal length $L_3 = 8$ mm
Degrees of equivalence: D_{i3} and expanded uncertainty U_{i3} ($k = 2$)



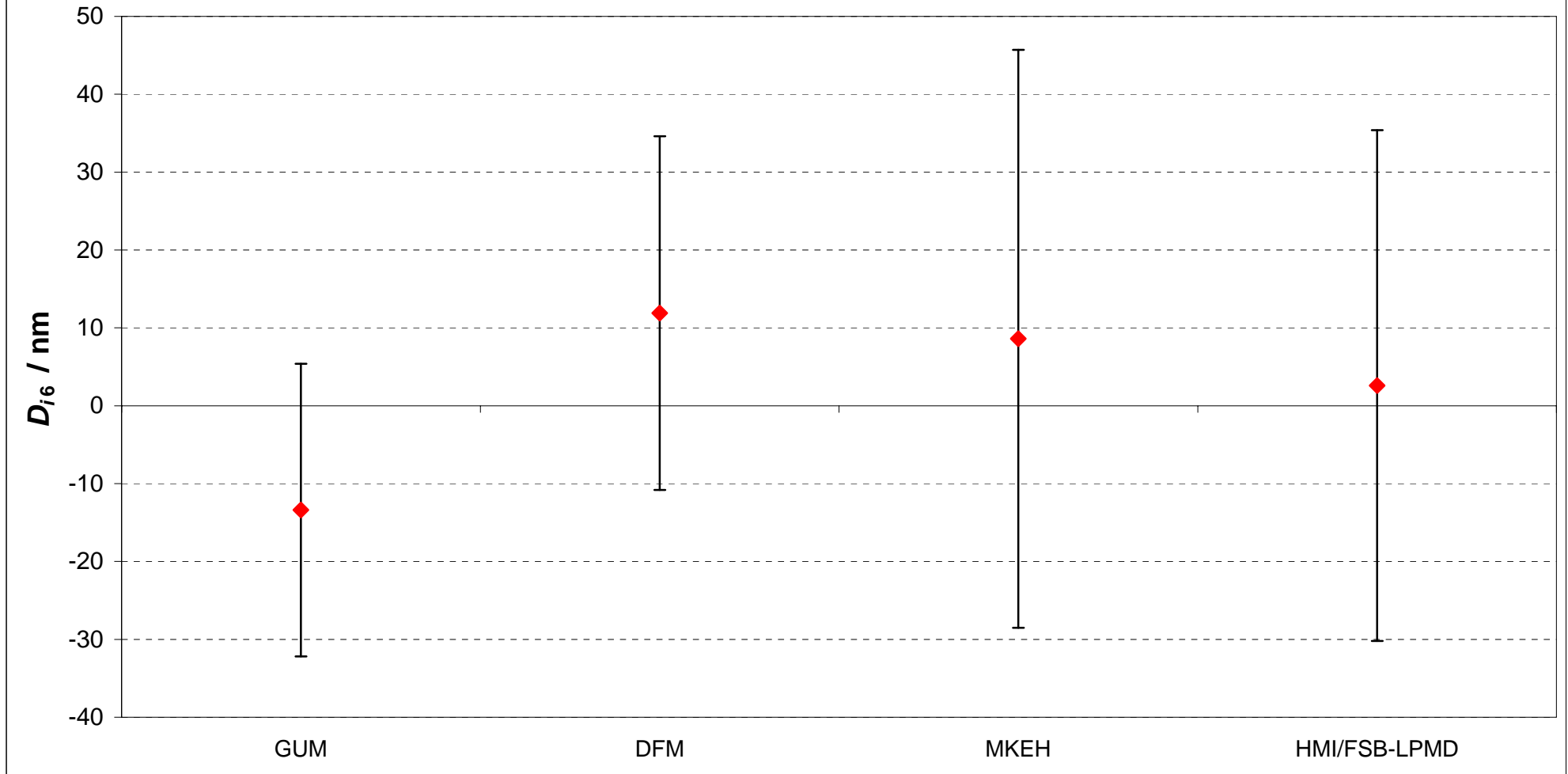
EURAMET.L-K1.2 Steel gauge block, nominal length $L_4 = 10$ mm
Degrees of equivalence: D_{i4} and expanded uncertainty U_{i4} ($k = 2$)



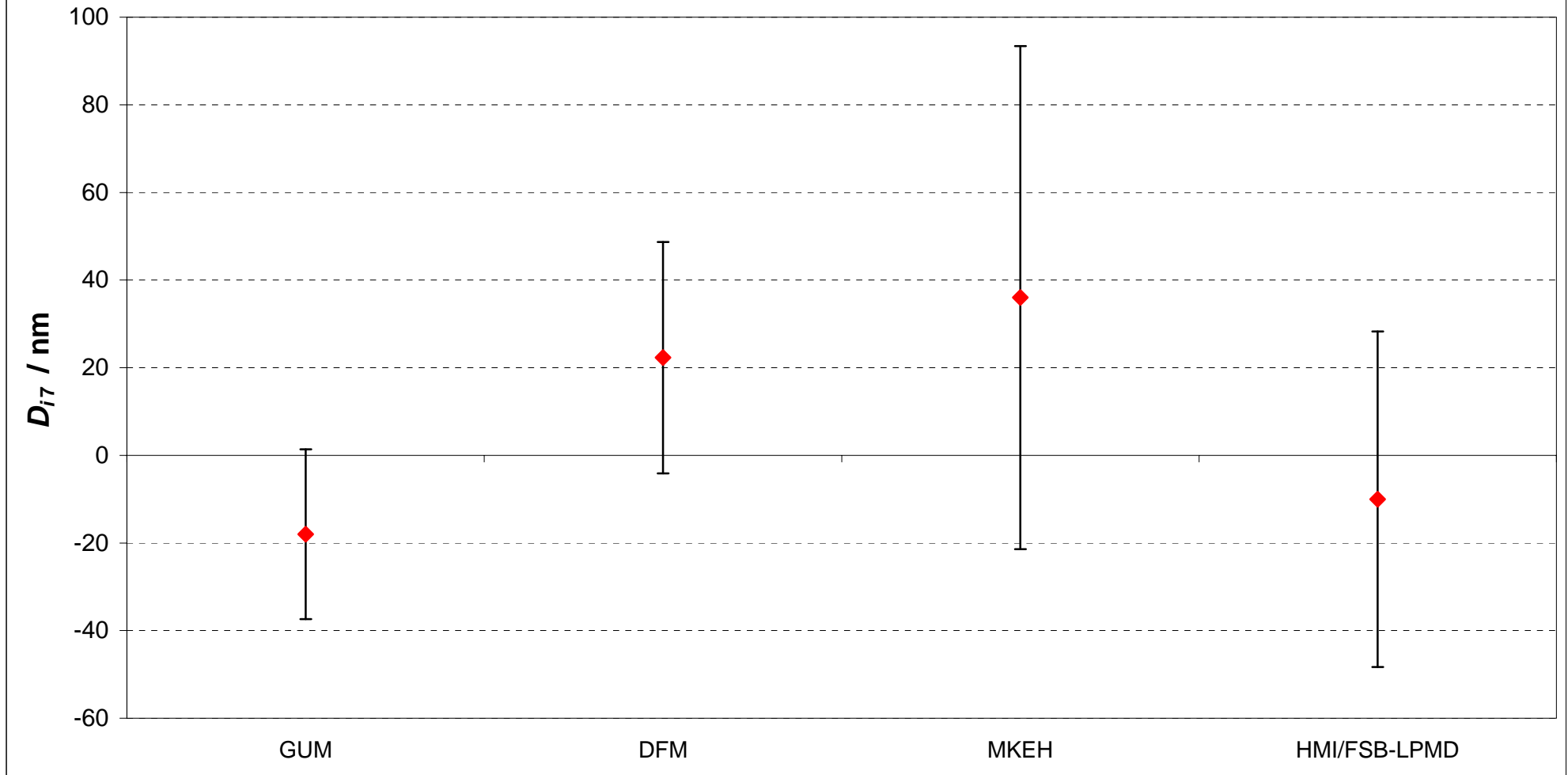
EURAMET.L-K1.2 Steel gauge block, nominal length $L_5 = 25$ mm
Degrees of equivalence: D_{i5} and expanded uncertainty U_{i5} ($k = 2$)



EURAMET.L-K1.2 Steel gauge block, nominal length $L_6 = 40$ mm
Degrees of equivalence: D_{i6} and expanded uncertainty U_{i6} ($k = 2$)



EURAMET.L-K1.2 Steel gauge block, nominal length $L_7 = 60$ mm
Degrees of equivalence: D_{i7} and expanded uncertainty U_{i7} ($k = 2$)



EURAMET.L-K1.2 Steel gauge block, nominal length $L_8 = 90$ mm
Degrees of equivalence: D_{i8} and expanded uncertainty U_{i8} ($k = 2$)

