Key comparison APMP.L-K1.1.2011

MEASURAND : Length of gauge blocks
TRAVELLING STANDARDS : 10 steel gauge blocks

x_i : average of the central length measured in two orientations by laboratory i, expressed as the deviation from nominal value
u_i : combined standard uncertainty of x_i

Nominal value / Lab *i*	0.5 mm		1.01 mm		1.1 mm		6 mm		7 mm		8 mm		15 mm		80 mm	
	x_i / µm	u_i / nm	x_i / µm	u_i / nm	x_i / µm	u_i / nm	x_i / µm	u_i / nm	x_i / µm	u_i / nm	x_i / µm	u_i / nm	x_i / µm	u_i / nm	x_i / µm	u_i / nm
KIM-LIPI	**0.207**	12	**0.088**	12	**0.027**	12	**0.110**	12	**0.048**	12	**-0.027**	12	**0.011**	13	**-0.378**	17
NMIJ	**0.194**	14	**0.087**	14	**0.012**	14	**0.110**	14	**0.044**	14	**-0.034**	14	**0.005**	15	**-0.395**	17

Nominal value / Lab *i*	90 mm		100 mm		Date of measurement
	x_i / µm	u_i / nm	x_i / µm	u_i / nm	
KIM-LIPI	**0.023**	19	**0.101**	20	October 2011
NMIJ	**-0.019**	18	**0.064**	19	November 2011

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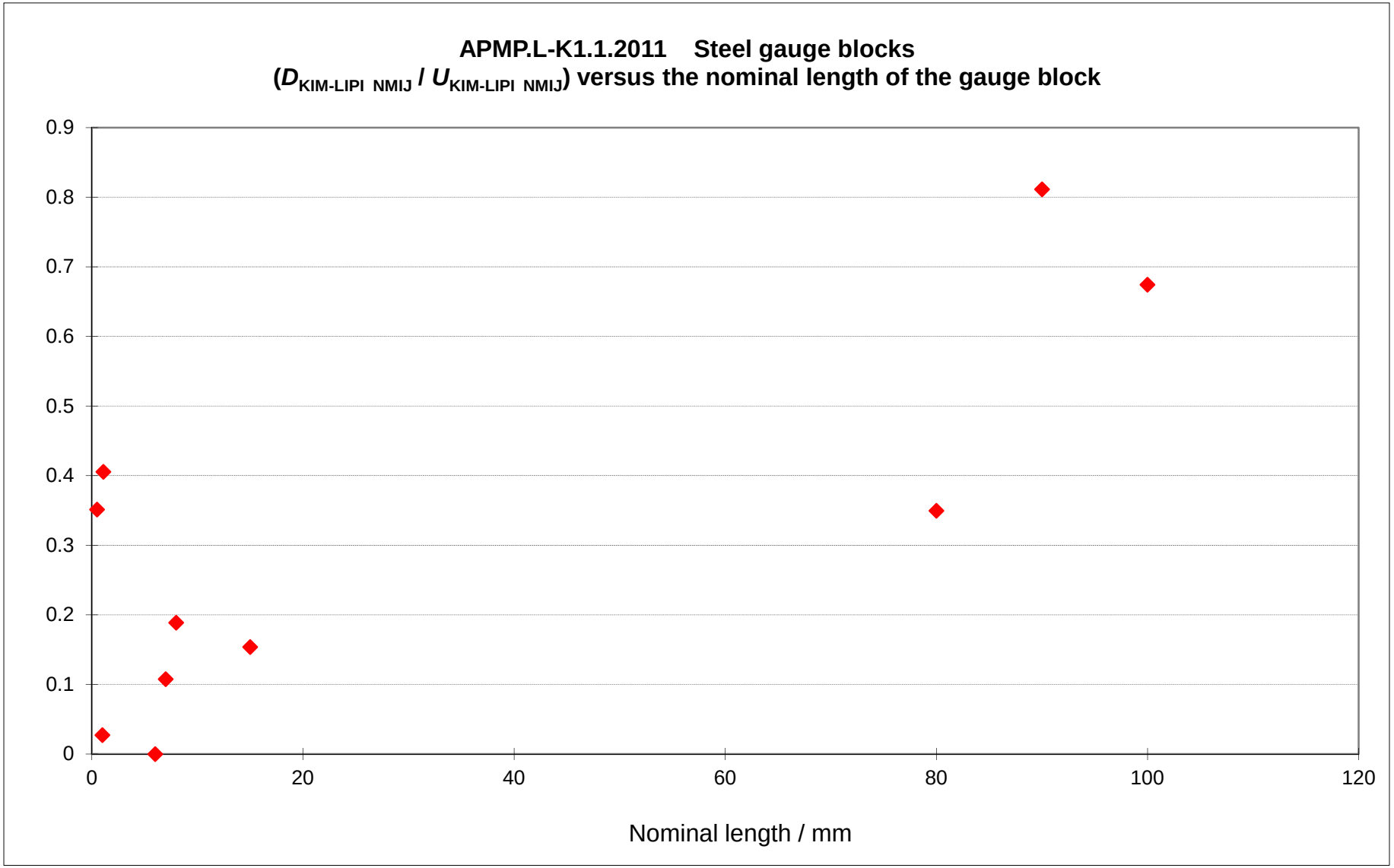
The aim of the data analysis is to establish the degrees of equivalence between the measurements performed by KIM-LIPI and NMIJ.

For each nominal value, the degree of equivalence between KIM-LIPI and NMIJ is given by a pair of terms, both expressed in nm:
the offset $D_{\text{KIM-LIPI NMIJ}} = x_{\text{KIM-LIPI}} - x_{\text{NMIJ}}$, and its expanded uncertainty ($k = 2$) $U_{\text{KIM-LIPI NMIJ}} = 2(u_{\text{KIM-LIPI}}^2 + u_{\text{NMIJ}}^2)^{1/2}$.
The ratio of these two terms is also computed and presented under graphical form.

0.5 mm		1.01 mm		1.1 mm		6 mm		7 mm	
$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm
13	37.0	**1**	37.0	**15**	37.0	**0**	37.0	**4**	37.1
Ratio: 0.35		**Ratio: 0.03**		**Ratio: 0.41**		**Ratio: 0.00**		**Ratio: 0.11**	

8 mm		15 mm		80 mm		90 mm		100 mm	
$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm	$D_{\text{KIM-LIPI NMIJ}}$ / nm	$U_{\text{KIM-LIPI NMIJ}}$ / nm
7	37.1	**6**	39.1	**17**	48.7	**42**	51.8	**37**	54.9
Ratio: 0.19		**Ratio: 0.15**		**Ratio: 0.35**		**Ratio: 0.81**		**Ratio: 0.67**	


APMP.L-K1.1.2011 Steel gauge blocks
($D_{KIM-LIPI\ NMIJ}$ / $U_{KIM-LIPI\ NMIJ}$) versus the nominal length of the gauge block
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
100
120
Nominal length / mm