

**CERTIFICATE OF INSPECTION**

APPLICANT: Name \_\_\_\_\_  
Address \_\_\_\_\_

INSTRUMENT: (1 set of 81 ) Gauge Block      Material: Steel  
Code No.: 516-903-26                              Manufacturer: Mitutoyo  
Type: BE1-81-1A/A                                Basis of Test: ASME B89.1.9-2002  
Serial No.: 1402829  
Grade: AS-1 (ASME)

DATE OF INSPECTION: 23th Apr. 2014

INSPECTION METHOD: The length of gauge block is determined by comparing it, using a gauge block comparator, with a reference gauge block of the same nominal length. Both gauge blocks were placed in a vertical position on the comparator with their left or unmarked measuring face down. For determining the deviation / variation of length,  $dc$  /  $d_{max}$  /  $d_{min}$  /  $v$  is measured at the center point and the four corner points about 1.5 mm from the face edges.

ENVIRONMENT: Air temperature  $(68 \pm 1.8)F$  [ $(20 \pm 1.0) ^\circ C$ ]

RESULTS: The results apply to the reference temperature of  $20^\circ C$  (ITS-90). For correction of the thermal expansion, an expansion coefficient of the gauge block of  $(6.0 \pm 0.3) \times 1E-6/F$  [ $(10.8 \pm 0.5) \times 1E-6/K$ ] is used. The result of the calibration are presented on the next page.

Expanded Uncertainty:  $4''$  or less  $2.4 \mu$  inch                              (L = Nominal length) L:inch  
(For Central Deviation) Up to  $20''$   $(1.2 + L / 2.3) \mu$  inch

(k=2)

The uncertainty presented above is based on a standard uncertainty multiplied by a coverage factor of k=2, which provides a confidence level of approximately 95%. The standard uncertainty has been determined in accordance with BAL-R2.

TRACEABILITY: Traceable to NIST via No. 683/283699-13  
(NIST=National Institute of Standard and Technology)

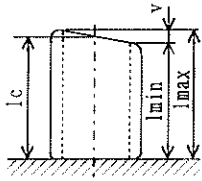
NIST:Confirmation of technical capability  
by the transfer standard. (ISO/IEC17043)

Date 23th Apr. 2014



H. Takeyama

Result: The following table states for each gauge block the measured deviation from the nominal length at the center point and the measured deviation / variation of length.



Nominal Length	$l_n$	Maximum Deviation	$d_{max}=l_{max}-l_n$
Central Length	$l_c$	Minimum Length	$l_{min}$
Central Deviation	$dc=l_c-l_n$	Minimum Deviation	$d_{min}=l_{min}-l_n$
Maximum Length	$l_{max}$	Variation	$v=l_{max}-l_{min}$

Unit:  $\mu$ inch

Nominal Length $l_n$ inch	Ident. No.	Central Dev. $dc$	Max. Dev. $d_{max}$	Min. Dev. $d_{min}$	Var. $v$
0.05	140241	0.0	0.0	-2.0	2.0
0.1	140001	+1.2	+1.2	-0.4	1.6
0.1001	140456	+3.1	+3.1	+2.0	1.1
0.1002	130126	+0.4	+1.6	-2.0	3.6
0.1003	130258	+1.6	+1.6	+1.2	0.4
0.1004	140335	+1.2	+3.1	-0.4	3.5
0.1005	140282	0.0	+0.8	-2.4	3.2
0.1006	130943	-1.2	-1.2	-3.9	2.7
0.1007	140985	-1.6	-1.6	-3.5	1.9
0.1008	140766	-0.8	-0.8	-3.5	2.7
0.1009	130304	+3.5	+3.5	+2.4	1.1
0.101	130716	+2.8	+3.5	+1.6	1.9
0.102	140547	+1.6	+1.6	+0.8	0.8
0.103	140203	-1.6	-1.2	-2.8	1.6
0.104	130926	+0.8	+0.8	-0.8	1.6
0.105	140401	0.0	0.0	-1.2	1.2
0.106	130645	+0.8	+0.8	0.0	0.8
0.107	140416	-2.4	-1.2	-3.5	2.3
0.108	130689	+0.4	+0.8	-0.8	1.6
0.109	140488	+2.0	+2.8	+0.4	2.4
0.11	140631	+0.8	+1.2	+0.4	0.8
0.111	130171	-2.0	-2.0	-3.5	1.5
0.112	140623	-1.2	-0.8	-3.1	2.3
0.113	140537	+0.4	+0.8	-2.4	3.2
0.114	140302	-2.4	-0.8	-5.5	4.7
0.115	120282	+2.4	+3.1	+0.8	2.3
0.116	140022	+0.4	+0.4	-2.0	2.4
0.117	140189	+0.8	+2.4	-0.8	3.2
0.118	130658	+0.4	+0.4	-0.8	1.2
0.119	130885	-2.0	-1.6	-2.0	0.4
0.12	140289	+2.4	+2.8	+2.4	0.4
0.121	140317	+3.9	+3.9	+2.4	1.5
0.122	130407	-1.2	-0.4	-2.0	1.6
0.123	140056	0.0	+0.8	-2.4	3.2
0.124	130684	+1.6	+1.6	0.0	1.6
0.125	130609	-2.4	-1.2	-4.3	3.1
0.126	130128	-0.8	-0.8	-2.8	2.0
0.127	140315	-1.2	-0.8	-2.8	2.0
0.128	140120	+3.1	+3.9	+1.6	2.3

Nominal Length In inch	Ident. No.	Central Dev. dc	Max. Dev. dmax	Min. Dev. dmin	Var. v
0.129	140264	+2.4	+2.4	+0.8	1.6
0.13	140759	+2.0	+2.0	-0.4	2.4
0.131	140050	-0.8	+0.8	-3.1	3.9
0.132	140031	0.0	+0.8	-2.4	3.2
0.133	140569	+0.4	+1.2	-2.0	3.2
0.134	130060	+2.4	+3.1	+0.4	2.7
0.135	140513	+3.1	+3.5	+1.2	2.3
0.136	140483	+2.8	+2.8	-1.2	4.0
0.137	130127	-0.8	-0.8	-3.1	2.3
0.138	140255	-1.6	-1.6	-2.8	1.2
0.139	140208	-2.0	-1.6	-2.8	1.2
0.14	130934	+2.4	+2.8	+1.2	1.6
0.141	140037	+0.8	+0.8	-0.8	1.6
0.142	130357	-2.4	-2.0	-2.8	0.8
0.143	140849	+3.1	+3.1	+1.2	1.9
0.144	140054	-0.8	+0.8	-1.6	2.4
0.145	130063	+0.8	+0.8	-0.8	1.6
0.146	140318	-1.2	-0.4	-3.1	2.7
0.147	130600	+2.0	+2.4	-1.2	3.6
0.148	140307	-0.4	-0.4	-2.8	2.4
0.149	140099	+2.0	+2.0	-2.0	4.0
0.15	130869	0.0	0.0	-2.8	2.8
0.2	140682	0.0	+0.4	-1.2	1.6
0.25	130181	-0.8	-0.8	-2.8	2.0
0.3	140264	+1.6	+2.8	+0.4	2.4
0.35	130238	+2.8	+2.8	+0.8	2.0
0.4	130342	+2.4	+2.4	-0.8	3.2
0.45	130245	+0.8	+0.8	-2.4	3.2
0.5	131580	+3.5	+3.5	+0.4	3.1
0.55	130445	0.0	0.0	-1.6	1.6
0.6	130492	+3.5	+3.5	+0.4	3.1
0.65	140063	+2.4	+2.4	-0.8	3.2
0.7	130445	+2.4	+2.4	-0.8	3.2
0.75	130645	+2.0	+2.0	0.0	2.0
0.8	130558	+2.0	+2.0	+0.4	1.6
0.85	140060	+2.0	+2.4	-0.8	3.2
0.9	130263	+0.4	+0.8	-2.4	3.2
0.95	140005	+1.6	+1.6	-1.6	3.2
1	140468	+2.8	+2.8	+0.8	2.0
2	131484	+2.4	+2.4	+1.2	1.2
3	130193	+7.1	+7.1	+3.9	3.2
4	131271	+3.5	+3.5	-2.4	5.9