Gauge Blocks

Length Standards Brought to You by Mitutoyo

Features and Accuracies

Features of Mitutoyo Gauge Blocks

Mitutoyo offers 3 types of gauge block for use as length standards: rectangular steel, rectangular ceramic (CERA Blocks) and square steel gauge blocks. In addition, rectangular and square protection blocks (1 mm and 2 mm for each) are available in tungsten carbide. Mitutoyo gauge blocks are recognized to be of the highest quality both here in Japan and abroad, and are available in various grades to meet every need in respect of working conditions, environment and application.

Accuracy

As a world-leading precision measuring equipment manufacturer, Mitutoyo is certified by the Japanese government as an accredited calibration laboratory, which means that the accuracy of its gauge blocks is guaranteed through traceability to the Metrology Management Center of the National Institute of Advanced Industrial Science and Technology (AIST).

Wringing

Lapping measuring surfaces is one of Mitutoyo's specialties. Our advanced technique, developed over more than half a century, enables us to achieve the optimum flatness and surface finish needed for gauge blocks and thus maximize the wringing force.

Abrasion Resistance and Dimensional Stability of Steel Blocks

High-carbon high-chrome steel is employed to satisfy a variety of the material characteristics required for gauge blocks. Our advanced heat treatment technology for steel blocks, which involves repeated temperature cycling, simultaneously achieves excellent abrasion resistance and minimizes any change in length over time.

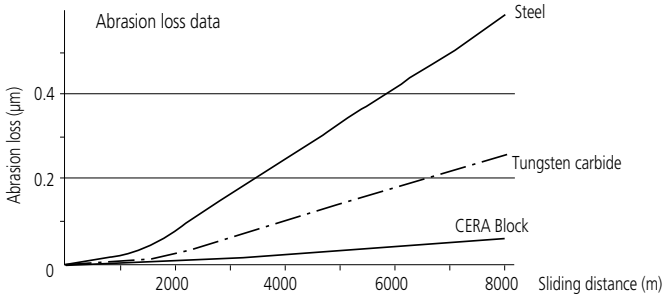
CERA Blocks

CERA blocks are made of a ceramic material with a superior surface finish, created by Mitutoyo's ultra-precision machining techniques, that provides a premium quality block with significant advantages:

1. Corrosion Resistant
Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.

2. No Burrs Caused by Accidental Mishandling
Since the CERA Block is very hard, it will not scratch easily and is highly resistant to burrs. If a burr is formed, it can easily be removed with a ceramic deburring stone (Ceraston).

3. Abrasion Resistant
CERA Blocks have 10 times the abrasion resistance of steel gauge blocks.

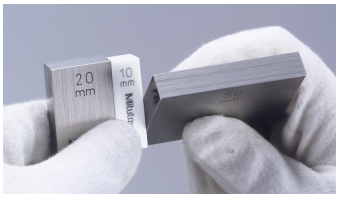


4. Dimensionally Stable
CERA Blocks are free from dimensional change over time.

5. Clearly Marked Sizes
Black characters, indicating the nominal length, are inscribed by laser and are clearly visible against the white surface of the block.

6. Non-magnetic Nature Prevents Steel Swarf Contamination

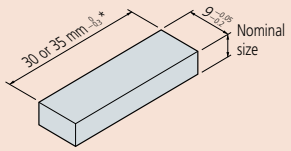
7. High Wringing Force
Superior flatness and surface finish provides maximum wringing force.



Classification of Gauge Blocks by Shape

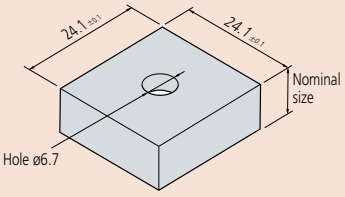
Mitutoyo broadly divides gauge blocks into two categories according to the block shape.

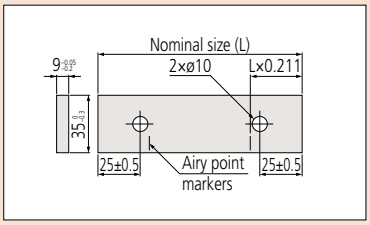
Rectangular gauge blocks



* Depends on the nominal size.
More than 10 mm: 35 mm
10mm or less: 30 mm

Square gauge blocks





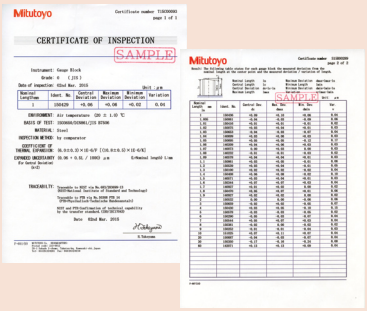
Coupling holes in long rectangular gauge blocks

Selecting Gauge Blocks

- Select gauge blocks in accordance with the combination range required.
  If a large length is required, use one or more blocks from a long-block set.
- Select gauge blocks in accordance with the minimum length step required. Add a wear block at each end of the stack if the workpiece material is abrasive, or the stack will be used frequently.
- If a set containing a large number of gauge blocks is selected, the number of gauge blocks required for any particular length is reduced and the number of combinations is increased. Accuracy of the blocks in the set will be retained longer because normal wear will be spread over a larger number of blocks.
- Gauge block sets dedicated to micrometer and caliper inspection are available (refer to page E-11 for details).
- If using only one length repeatedly, it is a good idea to purchase discrete gauge blocks (refer to page E-13, E-14, E-15, E-16, and E-24 for details) .
- 2 mm-based gauge blocks, which take the base of the minimum length step as 2 mm, are available and many people find them easier to handle than 1 mm-based gauge blocks.

Mitutoyo Gauge Blocks and Inspection Certificates

A Certificate of Inspection is furnished with all Mitutoyo gauge blocks with a serial number on the box (in the case of sets) and an identification number on each block. The deviation of each block from nominal length, at the time of inspection, is stated. For this inspection, each gauge block is measured relative to the upper level master using a gauge block comparator. Grade K gauge blocks are measured by a primary measurement method using an interferometer.



Grade and Application

The following table can be used to select the gauge block grade according to usage (specified by DIN861, BS4311, and JIS B 7506).

	Applications	Grade
Workshop use	• Mounting tools and cutters	2
	• Manufacturing gages • Calibrating instruments	1 or 2
Inspection use	• Inspecting mechanical parts, tools, etc.	1 or 2
	• Checking the accuracy of gages • Calibrating instruments	0 or 1
Calibration use	• Checking the accuracy of gauge blocks for workshop • Checking the accuracy of gauge blocks for inspection • Checking the accuracy of instruments	K or 0
Reference use	• Checking the accuracy of gauge blocks for calibration • For academic research	K

Constructing a Gauge Block Stack

The following points should be noted when constructing a gauge block stack:

1. Use as few gauge blocks as possible to obtain the required length by selecting thick blocks wherever possible.
2. Select the block for the least significant digit first, then work back through the more significant digits until the required length is attained.
3. There are multiple combinations for the integer part of a length. To prevent wear as much as possible, do not always use the same gauge blocks.

Example: Required length = 45.6785 mm

• For a 1 mm-based gauge block set (112 pcs.)

1.0005
1.008
1.17
17.5
+) 25
45.6785 mm

• For a 2 mm-based gauge block set (112 pcs.)

2.0005
2.008
2.17
14.5
+) 25
45.6785 mm

* Regarding the method for wringing, refer to "Quick Guide to Precision Measuring Instruments" on page E-33.

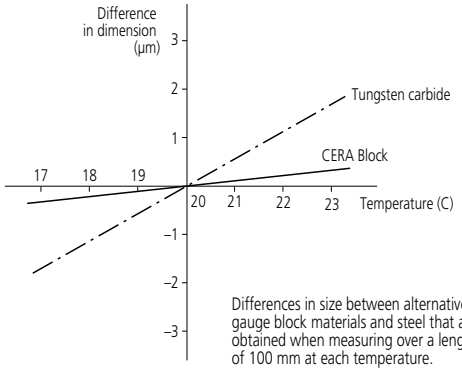
8. Superior Material Characteristics of CERA Block

Property \ Material	CERA Block (ZrO_2)	Steel (Fe)	Tungsten Carbide (WC-Co)	ZERO CERA Blocks (Low thermal expansion)
Hardness (HV)	**1350**	800	1650	826
Coefficient of thermal expansion (10^{-6}/K)	**9.3±0.5**	10.8±0.5	5.5±1.0	0±0.02
Flexural strength by 3-point bending (MPa)	**1270**	1960	1960	210
Fracture toughness K_{1C} (MPa·$m^{1/2}$)	**7**	120	12	1.2
Young's modulus x10^4 (MPa)	**20.6**	20.6	61.8	130
Poisson's ratio	**0.3**	0.3	0.2	0.3
Specific gravity (Kg/dm^3)	**6.0**	7.8	14.8	2.5
Thermal conductivity (W/m·k)	**2.9**	54.4	79.5	3.7

Note: Ceramics have the advantage of a slow response to temperature changes due to the low thermal conductivity. However, caution is required when using CERA blocks under conditions of rapid temperature change.

9. Closest Expansion Coefficient to Steel

The thermal expansion coefficient of a CERA Block is quite similar to that of a steel gauge block.



Differences in size between alternative gauge block materials and steel that are obtained when measuring over a length of 100 mm at each temperature.

10. Highly Resistant to Dropping and Impact Damage

The CERA Block material is one of the toughest ceramics. It is extremely difficult to crack a CERA block in normal use.

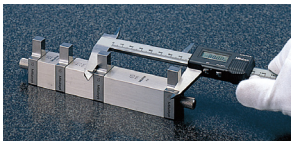
Features of Square Gauge Blocks

1. Gauge blocks in a stack can be clamped together

After wringing square gauge blocks, a tie rod can be inserted through the center hole to clamp the blocks together for extra security.

2. A height reference standard can easily be made

A precision height reference standard can be made easily and inexpensively using accessories such as the plain jaw and block base.



3. A dedicated inspection jig can easily be made

A dedicated inspection jig for periodic inspection of instruments can be made easily and inexpensively.

4. A wide measuring surface with cross-sectional dimensions of 24.1 x 24.1 mm is available.

A square gauge block retains stable orientation both longitudinally and laterally. A wide range of applications is covered, including cutting tool positioning, angle measurement with a sine bar, taper measurement with a roller, and inspection of depth micrometers.

Long and Ultra-Thin Gauge Blocks

Mitutoyo offers extra-thin gauge blocks from 0.10 mm to 0.99 mm (increments of 0.01 mm) as well as long gauge blocks up to 1,000 mm as standard products.

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

ACCURACY SPECIFICATIONS: JIS B 7506-2004 (JAPAN)

Nominal length (mm)		Grade K		Grade 0	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
from 0.5	up to 10	±0.20 µm	0.05 µm	±0.12 µm	0.10 µm
over 10	up to 25	±0.30 µm	0.05 µm	±0.14 µm	0.10 µm
over 25	up to 50	±0.40 µm	0.06 µm	±0.20 µm	0.10 µm
over 50	up to 75	±0.50 µm	0.06 µm	±0.25 µm	0.12 µm
over 75	up to 100	±0.60 µm	0.07 µm	±0.30 µm	0.12 µm
over 100	up to 150	±0.80 µm	0.08 µm	±0.40 µm	0.14 µm
over 150	up to 200	±1.00 µm	0.09 µm	±0.50 µm	0.16 µm
over 200	up to 250	±1.20 µm	0.10 µm	±0.60 µm	0.16 µm
over 250	up to 300	±1.40 µm	0.10 µm	±0.70 µm	0.18 µm
over 300	up to 400	±1.80 µm	0.12 µm	±0.90 µm	0.20 µm
over 400	up to 500	±2.20 µm	0.14 µm	±1.10 µm	0.25 µm
over 500	up to 600	±2.60 µm	0.16 µm	±1.30 µm	0.25 µm
over 600	up to 700	±3.00 µm	0.18 µm	±1.50 µm	0.30 µm
over 700	up to 800	±3.40 µm	0.20 µm	±1.70 µm	0.30 µm
over 800	up to 900	±3.80 µm	0.20 µm	±1.90 µm	0.35 µm
over 900	up to 1000	±4.20 µm	0.25 µm	±2.00 µm	0.40 µm

BS EN ISO 3650: 1999 (UK)

(at 20 °C)

Nominal length (mm)		Grade 1		Grade 2	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
from 0.5	up to 10	±0.20 µm	0.16 µm	±0.45 µm	0.30 µm
over 10	up to 25	±0.30 µm	0.16 µm	±0.60 µm	0.30 µm
over 25	up to 50	±0.40 µm	0.18 µm	±0.80 µm	0.30 µm
over 50	up to 75	±0.50 µm	0.18 µm	±1.00 µm	0.35 µm
over 75	up to 100	±0.60 µm	0.20 µm	±1.20 µm	0.35 µm
over 100	up to 150	±0.80 µm	0.20 µm	±1.60 µm	0.40 µm
over 150	up to 200	±1.00 µm	0.25 µm	±2.00 µm	0.40 µm
over 200	up to 250	±1.20 µm	0.25 µm	±2.40 µm	0.45 µm
over 250	up to 300	±1.40 µm	0.25 µm	±2.80 µm	0.50 µm
over 300	up to 400	±1.80 µm	0.30 µm	±3.60 µm	0.50 µm
over 400	up to 500	±2.20 µm	0.35 µm	±4.40 µm	0.60 µm
over 500	up to 600	±2.60 µm	0.40 µm	±5.00 µm	0.70 µm
over 600	up to 700	±3.00 µm	0.45 µm	±6.00 µm	0.70 µm
over 700	up to 800	±3.40 µm	0.50 µm	±6.50 µm	0.80 µm
over 800	up to 900	±3.80 µm	0.50 µm	±7.50 µm	0.90 µm
over 900	up to 1000	±4.20 µm	0.60 µm	±8.00 µm	1.00 µm

ACCURACY SPECIFICATIONS: BS 4311: 2007

Nominal length (inch)		Grade K		Grade 0	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
over 0	up to 0.4	±8 µin	2 µin	±5 µin	4 µin
over 0.4	up to 1	±12 µin	2 µin	±6 µin	4 µin
over 1	up to 2	±16 µin	3 µin	±8 µin	4 µin
over 2	up to 3	±20 µin	3 µin	±10 µin	5 µin
over 3	up to 4	±24 µin	3 µin	±12 µin	5 µin

(at 20 °C)

Nominal length (inch)		Grade 1		Grade 2	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
over 0	up to 0.4	±8 µin	6 µin	±18 µin	12 µin
over 0.4	up to 1	±12 µin	6 µin	±24 µin	12 µin
over 1	up to 2	±16 µin	7 µin	±32 µin	12 µin
over 2	up to 3	±20 µin	7 µin	±40 µin	14 µin
over 3	up to 4	±24 µin	8 µin	±48 µin	14 µin

ACCURACY SPECIFICATIONS: ASME B89.1.9-2002 (USA)

Nominal length (inch)		Grade K		Grade 00		Grade 0		Grade 1		Grade 2	
		Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length
	up to 0.05	±12 µin	2 µin	±4 µin	2 µin	±6 µin	4 µin	±12 µin	6 µin	±24 µin	12 µin
over 0.05	up to 0.4	±10 µin	2 µin	±3 µin	2 µin	±5 µin	4 µin	±8 µin	6 µin	±18 µin	12 µin
over 0.45	up to 1	±12 µin	2 µin	±3 µin	2 µin	±6 µin	4 µin	±12 µin	6 µin	±24 µin	12 µin
over 1	up to 2	±16 µin	2 µin	±4 µin	2 µin	±8 µin	4 µin	±16 µin	6 µin	±32 µin	12 µin
over 2	up to 3	±20 µin	2 µin	±5 µin	3 µin	±10 µin	4 µin	±20 µin	6 µin	±40 µin	14 µin
over 3	up to 4	±24 µin	3 µin	±6 µin	3 µin	±12 µin	5 µin	±24 µin	8 µin	±48 µin	14 µin
over 4	up to 5	±32 µin	3 µin	±8 µin	3 µin	±16 µin	5 µin	±32 µin	8 µin	±64 µin	16 µin
over 5	up to 6	±32 µin	3 µin	±8 µin	3 µin	±16 µin	5 µin	±32 µin	8 µin	±64 µin	16 µin
over 6	up to 7	±40 µin	4 µin	±10 µin	4 µin	±20 µin	6 µin	±40 µin	10 µin	±80 µin	16 µin
over 7	up to 8	±40 µin	4 µin	±10 µin	4 µin	±20 µin	6 µin	±40 µin	10 µin	±80 µin	16 µin
over 8	up to 10	±48 µin	4 µin	±12 µin	4 µin	±24 µin	6 µin	±48 µin	10 µin	±104 µin	18 µin
over 10	up to 12	±56 µin	4 µin	±14 µin	4 µin	±28 µin	7 µin	±56 µin	10 µin	±112 µin	20 µin
over 12	up to 16	±72 µin	5 µin	±18 µin	5 µin	±36 µin	8 µin	±72 µin	12 µin	±144 µin	20 µin
over 16	up to 20	±88 µin	6 µin	±20 µin	6 µin	±44 µin	10 µin	±88 µin	14 µin	±176 µin	24 µin
over 20	up to 24	±104 µin	6 µin	±25 µin	6 µin	±52 µin	10 µin	±104 µin	16 µin	±200 µin	28 µin
over 24	up to 28	±120 µin	7 µin	±30 µin	7 µin	±60 µin	12 µin	±120 µin	18 µin	±240 µin	28 µin
over 28	up to 32	±136 µin	8 µin	±34 µin	8 µin	±68 µin	12 µin	±136 µin	20 µin	±260 µin	32 µin
over 32	up to 36	±152 µin	8 µin	±38 µin	8 µin	±76 µin	14 µin	±152 µin	20 µin	±300 µin	36 µin
over 36	up to 40	±160 µin	10 µin	±40 µin	10 µin	±80 µin	16 µin	±168 µin	24 µin	±320 µin	40 µin

(at 20 °C)

Nominal length (mm)		Grade K		Grade 00		Grade 0		Grade 1		Grade 2	
		Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length
	up to 0.5	±0.30 µm	0.05 µm	±0.10 µm	0.05 µm	±0.14 µm	0.10 µm	±0.30 µm	0.16 µm	±0.60 µm	0.30 µm
over 0.5	up to 10	±0.20 µm	0.05 µm	±0.07 µm	0.05 µm	±0.12 µm	0.10 µm	±0.20 µm	0.16 µm	±0.45 µm	0.30 µm
over 10	up to 25	±0.30 µm	0.05 µm	±0.07 µm	0.05 µm	±0.14 µm	0.10 µm	±0.30 µm	0.16 µm	±0.60 µm	0.30 µm
over 25	up to 50	±0.40 µm	0.06 µm	±0.10 µm	0.06 µm	±0.20 µm	0.10 µm	±0.40 µm	0.18 µm	±0.80 µm	0.30 µm
over 50	up to 75	±0.50 µm	0.06 µm	±0.12 µm	0.06 µm	±0.25 µm	0.12 µm	±0.50 µm	0.18 µm	±1.00 µm	0.35 µm
over 75	up to 100	±0.60 µm	0.07 µm	±0.15 µm	0.07 µm	±0.30 µm	0.12 µm	±0.60 µm	0.20 µm	±1.20 µm	0.35 µm
over 100	up to 150	±0.80 µm	0.08 µm	±0.20 µm	0.08 µm	±0.40 µm	0.14 µm	±0.80 µm	0.20 µm	±1.60 µm	0.40 µm
over 150	up to 200	±1.00 µm	0.09 µm	±0.25 µm	0.09 µm	±0.50 µm	0.16 µm	±1.00 µm	0.25 µm	±2.00 µm	0.40 µm
over 200	up to 250	±1.20 µm	0.10 µm	±0.30 µm	0.10 µm	±0.60 µm	0.16 µm	±1.20 µm	0.25 µm	±2.40 µm	0.45 µm
over 250	up to 300	±1.40 µm	0.10 µm	±0.35 µm	0.10 µm	±0.70 µm	0.18 µm	±1.40 µm	0.25 µm	±2.80 µm	0.50 µm
over 300	up to 400	±1.80 µm	0.12 µm	±0.45 µm	0.12 µm	±0.90 µm	0.20 µm	±1.80 µm	0.30 µm	±3.60 µm	0.50 µm
over 400	up to 500	±2.20 µm	0.14 µm	±0.50 µm	0.14 µm	±1.10 µm	0.25 µm	±2.20 µm	0.35 µm	±4.40 µm	0.60 µm
over 500	up to 600	±2.60 µm	0.16 µm	±0.65 µm	0.16 µm	±1.30 µm	0.25 µm	±2.60 µm	0.40 µm	±5.00 µm	0.70 µm
over 600	up to 700	±3.00 µm	0.18 µm	±0.75 µm	0.18 µm	±1.50 µm	0.30 µm	±3.00 µm	0.45 µm	±6.00 µm	0.70 µm
over 700	up to 800	±3.40 µm	0.20 µm	±0.85 µm	0.20 µm	±1.70 µm	0.30 µm	±3.40 µm	0.50 µm	±6.50 µm	0.80 µm
over 800	up to 900	±3.80 µm	0.20 µm	±0.95 µm	0.20 µm	±1.90 µm	0.35 µm	±3.80 µm	0.50 µm	±7.50 µm	0.90 µm
over 900	up to 1000	±4.20 µm	0.25 µm	±1.00 µm	0.25 µm	±2.00 µm	0.40 µm	±4.20 µm	0.60 µm	±8.00 µm	1.00 µm

An inspection certificate is supplied as standard. Refer to page E-4 for details.

Suffix Number* (-■■■) for Selecting Standard Required

ISO/DIN/JIS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-01B	K	O	O

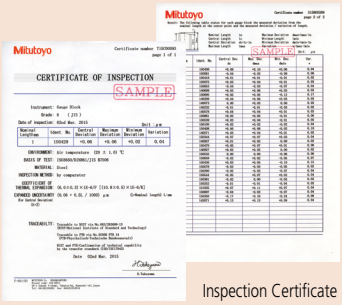
ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-51B	K	O	O

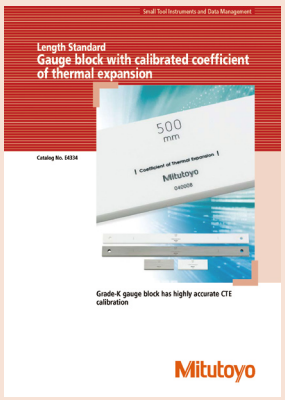
BS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-11B	K	O	O

* Only for 100 mm type



Inspection Certificate



For details, please refer to Leaflet No. E4334 "Gauge Block with calibrated coefficient of thermal expansion".

An inspection certificate is supplied as standard. Refer to page E-4 for details.

For details, please refer to Leaflet No. E4331 "ZERO CERA BLOCK"

Gauge Blocks with Calibrated Coefficient of Thermal Expansion

- Mitutoyo offers top-quality gauge blocks (steel and ceramic), superior to K class blocks due to their advanced manufacturing technologies.
- Features an accurately calibrated thermal expansion coefficient measured with a proprietary double-faced interferometer (DFI).
- Each gauge block is calibrated for length on a highly accurate gauge block interferometer (GBI) system.
- Available as rectangular gauge blocks in the range 100 to 500 mm.

SPECIFICATIONS

Metric Blocks with CTE

Order No. (steel)*	Order No. (CERA)*	Length (mm)
611681	613681	100
611802	613802	125
611803	613803	150
611804	613804	175
611682	613682	200
611805	613805	250
611683	613683	300
611684	613684	400
611685	613685	500

Inch Blocks with CTE

Order No. (steel)*	Order No. (CERA)*	Length (inch)
611204	613204	4
611205	613205	5
611206	613206	6
611207	613207	7
611208	613208	8
611222	613222	10
611223	613223	12
611224	613224	16
611225	613225	20

Grade	K class in JIS/ASME/ISO
Uncertainty of thermal expansion coefficient	0.035 × 10^{-6}/K (k = 2)
Uncertainty of length measurement	30 nm (k = 2), for 100 mm block

Note: An inspection certificate and a JCSS calibration certificate are supplied as standard.
A calibration report and a calibration certificate for the thermal expansion coefficient are also supplied as standard.

ZERO CERA Blocks

- Thermal expansion in the temperature range 20±1 °C is less than 1/500 that of steel (0±0.02×10^{-6}/K(20 °C))
- Almost no secular change both in dimension and coefficient of thermal expansion
- Complementary ultra-low thermal expansion and high specific rigidity (Young's modulus/ specific gravity)

SPECIFICATIONS

Metric Blocks

Order No. JIS/ISO/DIN	Order No. BS	Order No. ASME	Length (mm)
617673-016	617673-116	617673-516	30
617675-016	617675-116	617675-516	50
617681-016	617681-116	617681-516	100
617682-016	617682-116	617682-516	200
617683-016	617683-116	617683-516	300
617684-016	617684-116	617684-516	400
617685-016	617685-116	617685-516	500
617840-016	617840-116	617840-516	600
617841-016	617841-116	617841-516	700
617843-016	617843-116	617843-516	800
617844-016	617844-116	617844-516	900
617845-016	617845-116	617845-516	1000
516-771-60	516-771-61	516-771-66	Above set

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

Metric/Inch Rectangular Gauge Block Sets
SERIES 516

- Mitutoyo provides a wide selection of boxed sets of gauge blocks to meet the various needs of industry. Selecting the best set, or sets, to acquire usually depends on the accuracy required by the target applications, the level of convenience desired (larger sets offer more combination possibilities) and the environmental conditions in which they will be used.

Steel 1 mm Base Block Sets


Steel 112-block set


Steel 103-block set


Steel 76-block set


Steel 56-block set


Steel 47-block set


Steel 46-block set


Steel 34-block set


Steel 32-block set

Steel 0.001 mm Step Block Sets


Steel 9-block set


Steel 9-block set


Steel 18-block set

Steel Long Block Sets


Steel 8-block set

Steel Wear Block Sets


Steel 2-block set

Steel Thin Block Sets


Steel 9-block set

Note: Details of the contents of any particular set are given on page E-9.

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

CERA 1 mm Base Block Sets


CERA 112-block set


CERA 103-block set


CERA 76-block set


CERA 56-block set


CERA 47-block set


CERA 46-block set


CERA 34-block set


CERA 32-block set

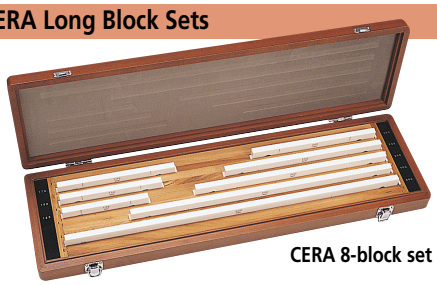
CERA 0.001 mm Step Block Sets

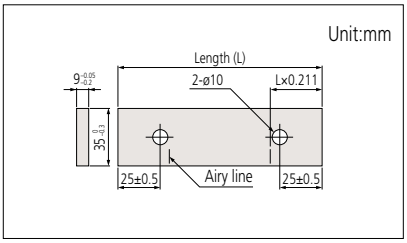

CERA 9-block set


CERA 9-block set


CERA 18-block set

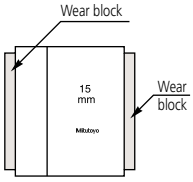
CERA Long Block Sets


CERA 8-block set



CERA Wear Block Sets


CERA 2-block set



Note: Details of the contents of any particular set are given on page E-10.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

SPECIFICATIONS

1 mm Base Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
122	—	—	—	—	—	1.0005		1
	516-596	—	K: -■0	—	—	1.001 - 1.009	0.001	9
	516-597	—	0: -■0	—	—	1.01 - 1.49	0.01	49
	516-598	—	1: -■0	—	—	1.6 - 1.9	0.1	4
	516-599	—	2: -■0	—	—	0.5 - 24.5	0.5	49
						30 - 100	10	8
						25, 75		2
112	516-531	516-541	—	K: -■6	—	1.0005		1
	516-937	516-337	K: -■0	00: -■6	K: -■1	1.001 - 1.009	0.001	9
	516-938	516-338	0: -■0	0: -■6	0: -■1	1.01 - 1.49	0.01	49
	516-939	516-339	1: -■0	1: -■6	1: -■1	0.5 - 24.5	0.5	49
	516-940	516-340	2: -■0	2: -■6	2: -■1	25 - 100	25	4
103	516-533	516-542	—	K: -■6	—	1.005		1
	516-941	516-341	K: -■0	00: -■6	K: -■1	1.01 - 1.49	0.01	49
	516-942	516-342	0: -■0	0: -■6	0: -■1	0.5 - 24.5	0.5	49
	516-943	516-343	1: -■0	1: -■6	1: -■1	25 - 100	25	4
	516-944	516-344	2: -■0	2: -■6	2: -■1			
88	—	—	—	—	—	1.0005		1
	516-969	516-369	—	—	K: -■1	1.001 - 1.009	0.001	9
	516-970	516-370	0: -■0	—	0: -■1	1.01 - 1.49	0.01	49
	516-971	516-371	1: -■0	—	1: -■1	0.5 - 9.5	0.5	19
	516-972	516-372	2: -■0	—	2: -■1	10 - 100	10	10
87	516-535	515-543	—	K: -■6	—	1.001 - 1.009	0.001	9
	516-945	516-345	K: -■0	00: -■6	K: -■1	1.01 - 1.49	0.01	49
	516-946	516-346	0: -■0	0: -■6	0: -■1	0.5 - 9.5	0.5	19
	516-947	516-347	1: -■0	1: -■6	1: -■1	10 - 100	10	10
	516-948	516-348	2: -■0	2: -■6	2: -■1			
76	—	—	—	—	—	1.005		1
	516-949	516-349	K: -■0	—	—	1.01 - 1.49	0.01	49
	516-950	516-350	0: -■0	—	—	0.5 - 9.5	0.5	19
	516-951	516-351	1: -■0	—	—	10 - 40	10	4
	516-952	516-352	2: -■0	—	—	50 - 100	25	3
56	516-536	516-544	—	K: -■6	—	0.5		1
	516-953	516-353	K: -■0	00: -■6	—	1.001 - 1.009	0.001	9
	516-954	516-354	0: -■0	0: -■6	—	1.01 - 1.09	0.01	9
	516-955	516-355	1: -■0	1: -■6	—	1.1 - 1.9	0.1	9
	516-956	516-356	2: -■0	2: -■6	—	1 - 24	1	24
						25 - 100	25	4
47	516-537	516-545	—	K: -■6	—	1.005		1
	516-957	516-357	K: -■0	00: -■6	—	1.01 - 1.09	0.01	9
	516-958	516-358	0: -■0	0: -■6	—	1.1 - 1.9	0.1	9
	516-959	516-359	1: -■0	1: -■6	—	1 - 24	1	24
	516-960	516-360	2: -■0	2: -■6	—	25 - 100	25	4
47	—	—	—	—	—	1.005		1
	516-961	516-361	K: -■0	—	K: -■1	1.01 - 1.19	0.01	19
	516-962	516-362	0: -■0	—	0: -■1	1.2 - 1.9	0.1	8
	516-963	516-363	1: -■0	—	1: -■1	1 - 9	1	9
	516-964	516-364	2: -■0	—	2: -■1	10 - 100	10	10
46	—	—	—	—	—	1.001 - 1.009	0.001	9
	516-994	516-394	K: -■0	—	—	1.01 - 1.09	0.01	9
	516-995	516-395	0: -■0	—	—	1.1 - 1.9	0.1	9
	516-996	516-396	1: -■0	—	—	1 - 9	1	9
	516-997	516-397	2: -■0	—	—	10 - 100	10	10
34	—	—	—	—	—	1.0005		1
	516-128	516-178	K: -■0	—	K: -■1	1.001 - 1.009	0.001	9
	516-129	516-179	0: -■0	—	0: -■1	1.01 - 1.09	0.01	9
	516-130	516-180	1: -■0	—	1: -■1	1.1 - 1.9	0.1	9
	516-131	516-181	2: -■0	—	2: -■1	1 - 5	1	5
						10		1
32	—	—	—	—	—	1.005		1
	516-965	516-365	K: -■0	—	K: -■1	1.01 - 1.09	0.01	9
	516-966	516-366	0: -■0	—	0: -■1	1.1 - 1.9	0.1	9
	516-967	516-367	1: -■0	—	1: -■1	1 - 9	1	9
	516-968	516-368	2: -■0	—	2: -■1	10 - 30	10	3
						60		1

Thin Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
9	516-990	—	0: -■0	—	—	0.10 - 0.50	0.05	9
	516-991	—	1: -■0	—	—			
	516-992	—	2: -■0	—	—			

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard. Refer to page E-4 for details.

* Suffix Number (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—
6	O	O

Suffix No. 1: Not available for Grade K sets.

ASME

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—
6	O	O

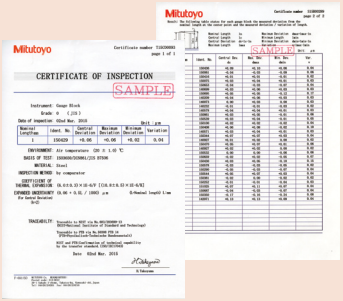
Suffix No. 1: Not available for Grade K sets.
Suffix No. 6: Only for Grade K sets.

BS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—
6	O	O

Suffix No. 1: Not available for Grade K sets.
Suffix No. 6: Only for Grade K sets.

Inspection Certificate



PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

SPECIFICATIONS

0.001 mm Step Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
18	**516-973**	**516-373**	K: **-■0**	—	—	0.991 - 0.999	0.001	9
	516-974	**516-374**	0: **-■0**	—	—	1.001 - 1.009	0.001	9
	516-975	**516-375**	1: **-■0**	—	—			
	516-976	**516-376**	2: **-■0**	—	—			
9	**516-981**	**516-381**	K: **-■0**	—	K: **-■1**	1.001 - 1.009	0.001	9
	516-982	**516-382**	0: **-■0**	—	0: **-■1**			
	516-983	**516-383**	1: **-■0**	—	1: **-■1**			
	516-984	**516-384**	2: **-■0**	—	2: **-■1**			
9	**516-985**	**516-385**	K: **-■0**	—	—	0.991 - 0.999	0.001	9
	516-986	**516-386**	0: **-■0**	—	—			
	516-987	**516-387**	1: **-■0**	—	—			
	516-988	**516-388**	2: **-■0**	—	—			

Long Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
8	**516-540**	**516-546**	—	K: **-■6**	—	125 - 175	25	3
	516-701	**516-731**	K: **-■0**	00: **-■6**	—	200 - 250	50	2
	516-702	**516-732**	0: **-■0**	0: **-■6**	—	300 - 500	100	3
	516-703	**516-733**	1: **-■0**	1: **-■6**	—			
	516-704	**516-734**	2: **-■0**	2: **-■6**	—			

Wear Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
2	**516-807**	**516-832**	0: **-■0**	0:**-■6**	—	1		2
	516-806	**516-833**	1: **-■0**	1:**-■6**	—			
2	**516-803**	**516-830**	0: **-■0**	0:**-■6**	—	2		2
	516-802	**516-831**	1: **-■0**	1:**-■6**	—			

Inch Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
82	**516-548**	**516-556**	—	K: **-■6**	—	0.10005		1
	516-905	**516-305**	—	00: **-■6**	—	0.1001 – 0.1009	0.0001	9
	516-906	**516-306**	—	0: **-■6**	0: **-■1**	0.101 – 0.149	0.001	49
	516-907	**516-307**	—	1: **-■6**	1: **-■1**	0.05 – 0.95	0.05	19
	516-908	**516-308**	—	2: **-■6**	2: **-■1**	1 - 4	1	4
81	**516-549**	**516-557**	—	K: **-■6**	—	0.1001 – 0.1009	0.0001	9
	516-901	**516-301**	—	00: **-■6**	—	0.101 – 0.149	0.001	49
	516-902	**516-302**	—	0: **-■6**	0: **-■1**	0.05 – 0.95	0.05	19
	516-903	**516-303**	—	1: **-■6**	1: **-■1**	1 - 4	1	4
	516-904	**516-304**	—	2: **-■6**	2: **-■1**			
49	—	—	—	—	—	0.1001 – 0.1009	0.0001	9
	—	—	—	—	—	0.101 – 0.109	0.001	9
	516-910	—	—	—	0: **-■1**	0.01 – 0.19	0.01	19
	516-911	—	—	—	1: **-■1**	0.2 - 0.9	0.1	8
	516-912	—	—	—	2: **-■1**	1 - 4	1	4
35	**516-550**	**516-558**	—	K: **-■6**	—	0.10005		1
	516-913	**516-313**	—	00: **-■6**	—	0.1001 – 0.1009	0.0001	9
	516-914	**516-314**	—	0: **-■6**	0: **-■1**	0.101 – 0.109	0.001	9
	516-915	**516-315**	—	1: **-■6**	1: **-■1**	0.11 – 0.19	0.01	9
	516-916	**516-316**	—	2: **-■6**	2: **-■1**	0.1 - 0.3	0.1	3
						0.5, 1, 2, 4		4

Thin Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
28	**516-551**	—	—	K: **-■6**	—	0.02005		1
	516-917	—	—	00: **-■6**	—	0.0201 – 0.0209	0.0001	9
	516-918	—	—	0: **-■6**	—	0.021 – 0.029	0.001	9
	516-919	—	—	1: **-■6**	—	0.01 – 0.09	0.01	9
	516-920	—	—	2: **-■6**	—			
10	**516-926**	—	—	0: **-■6**	0: **-■1**	0.005 - 0.050	0.005	10
	516-927	—	—	1: **-■6**	1: **-■1**			
	516-928	—	—	—	2: **-■1**			

Long Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
8	—	**516-564**	—	K: **-■6**	—	5 - 7	1	3
	—	**516-741**	—	00: **-■6**	—	8, 10, 12	2	3
	516-712	**516-742**	—	0: **-■6**	—	16, 20	4	2
	516-713	**516-743**	—	1: **-■6**	—			

Wear Block Sets

Blocks per set	Order No.		Standard / grade available and **Suffix No.***			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
2	**516-809**	**516-836**	—	0: **-■6**	—	0.05		2
	516-808	**516-837**	—	1: **-■6**	—			
2	**516-805**	**516-834**	—	0: **-■6**	—	0.1		2
	516-804	**516-835**	—	1: **-■6**	—			

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

Micrometer Inspection Gauge Block Sets SERIES 516

- Dedicated gauge block sets for micrometer inspection.
  Sets **516-106/7/8** and **516-322/3** are recommended for checking instrumental errors in micrometers due to the choice of block sizes ensuring that the instrument is checked through a full rotation of the spindle over the range 0-25 mm (or 0-1 inch).
  Sets **516-115/6/7**, **516-165/6** and **516-177** contain blocks in 25 mm (or 1 inch) steps for aiding inspection of large micrometers in conjunction with one of the abovementioned sets.
  Sets **516-580/1/2**, **516-390/1/2** are dedicated to the QuantuMike with its 2 mm/rev spindle feed.

Steel

Steel 10-block set

Steel 10-block set

Steel 8-block set

Steel 10-block set

CERA

CERA 10-block set

CERA 10-block set

CERA 8-block set

CERA 10-block set

Micro Checker

Can clamp a stack of gauge blocks to be used for micrometer inspection.

516-607
(The gauge blocks are optional.)

Gauge Block Sets for Micrometer Inspection

A set consisting of a Micro Checker and gauge blocks for micrometer inspection.

(516-132/3/4/5/6/7)

SPECIFICATIONS

Metric Micro Checker (holder only)

Order No.	516-607
Applicable gauge block set	**516-106, 516-107, 516-108, 516-156, 516-157, 516-158**
Applicable gauge block size (mm)	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25

Inch Micro Checker (holder only)

Order No.	516-608
Applicable gauge block set	**516-921, 516-922, 516-923, 516-321, 516-322, 516-323**
Applicable gauge block size (inch)	0.105, 0.210, 0.315, 0.420, 0.5, 0.605, 0.710, 0.815, 0.920, 1

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

*Suffix Number (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—
6	O	O

Suffix No. 1: Not available for Grade K sets.

ASME

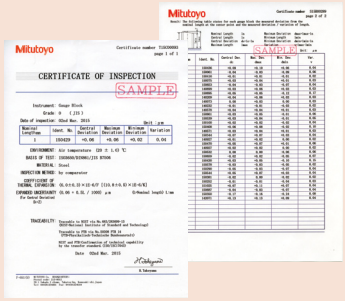
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—
6	O	O

Suffix No. 1: Not available for Grade K sets.
Suffix No. 6: Only for Grade K sets.

BS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—

Inspection Certificate



SPECIFICATIONS

Metric Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available and Suffix No.* ISO/DIN/JIS	ASME	BS	Blocks included in set
16	516-111 516-112 516-113	516-161 516-162 516-163	0: -■0 1: -■0 2: -■0	— — —	— — —	1.00, 1.25, 1.5, 2, 3, 5, 10, 15, 20, 25, 25.25, 30, 35, 40, 45, 50 mm, Cerastone, Optical parallels (t = 12 mm, 25 mm)
10	516-977 516-978 516-979 516-980	— 516-378 516-379 516-380	K: -■0 0: -■0 1: -■0 2: -■0	— — — —	— — — —	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25 mm, Optical parallel (t = 12 mm)
10	516-103 516-101 —	516-152 516-153 516-154	0: -■0 1: -■0 2: -■0	0: -■6 1: -■6 —	— — —	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25 mm
10	516-580 516-581 516-582	516-390 516-391 516-392	0: -■0 1: -■0 2: -■0	— — —	— — —	2.2, 4.8, 7.8, 10.4, 12, 15.2, 17.4, 19.6, 22.6, 25 mm
10	516-106 516-107 516-108	516-156 516-157 516-158	0: -■0 1: -■0 2: -■0	— — —	— — —	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25 mm, Optical parallel (t = 12 mm)
10	516-132 516-133 516-134	516-182 516-183 516-184	0: -■0 1: -■0 2: -■0	— — —	— — —	1.25, 1.50, 1, 2, 3, 5, 10, 15, 20, 25 mm, Micro Checker, Optical parallel (t = 12 mm)
10	516-135 516-136 516-137	516-185 516-186 516-187	0: -■0 1: -■0 2: -■0	— — —	— — —	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25 mm, Micro Checker, Optical parallel (t = 12 mm)
8	— — 516-115 516-116 516-117	516-547 516-164 516-165 516-166 516-167	— K: -■0 0: -■0 1: -■0 2: -■0	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	25, 50, 75, 100, 125, 150, 175, 200 mm

Inch Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available and Suffix No.* ISO/DIN/JIS	ASME	BS	Blocks included in set
10	516-528 516-529 516-530	516-318 516-319 516-320	— — —	00: -■6 0: -■6 1: -■6	0: -■1 1: -■1 2: -■1	0.087, 0.189, 0.307, 0.409, 0.472, 0.598, 0.669, 0.772, 0.890, 1 in
10	516-552 516-921 516-922 516-923	516-559 516-321 516-322 516-323	— — — —	K: -■6 00: -■6 0: -■6 1: -■6	— 0: -■1 1: -■1 2: -■1	0.105, 0.210, 0.315, 0.420, 0.500, 0.605, 0.710, 0.815, 0.920, 1 in, Optical parallel (t = 0.5 in)
10	516-553 516-138 516-139 516-140	516-560 516-188 516-189 516-190	— — — —	K: -■6 00: -■6 0: -■6 1: -■6	— 0: -■1 1: -■1 2: -■1	0.105, 0.210, 0.315, 0.420, 0.500, 0.605, 0.710, 0.815, 0.920, 1 in, Micro checker, Optical parallel (t = 0.5 in)
9	516-554 516-929 516-930 516-931 516-932	516-561 516-333 516-334 516-335 516-336	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	0.0625, 0.100, 0.125, 0.200, 0.250, 0.300, 0.500, 1, 2 in, Optical parallel (t = 0.5 in)
9	516-555 516-141 516-142 516-143 516-144	516-562 516-191 516-192 516-193 516-194	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	0.0625, 0.100, 0.125, 0.200, 0.250, 0.300, 0.500, 1, 2 in, Micro Checker, Optical parallel (t = 0.5 in)
9	— — 516-934 516-935 516-936	516-563 516-329 516-330 516-331 516-332	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	0.0625, 0.100, 0.125, 0.200, 0.250, 0.300, 0.500, 1, 2 in
8	516-126 516-127	516-176 516-177	— —	0: -■6 1: -■6	— —	1, 2, 3, 4, 5, 6, 7, 8 in

SERIES 516 – Caliper Inspection Gauge Block Sets

SPECIFICATIONS

Metric Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available and Suffix No. ISO/DIN/JIS	ASME	BS	Blocks included in set
5	— —	— 516-174	— 2: -10	— —	— —	5 pcs.: 10.3, 24.5, 50, 75, 100 mm, Ceramic plain jaws, Holder (250 mm), Glove
4	516-526 516-527	516-566 516-567	1: -10 2: -10	— —	— —	4 pcs.: 10, 30, 50, 125 mm, Setting ring (ø4 mm, ø10 mm), Pin gage (ø10 mm), Glove
3	516-124 516-125	516-150 516-151	1: -10 2: -10	— —	— —	3 pcs.: 30, 41.3, 131.4 mm, Setting ring (ø4 mm, ø25 mm), Glove
2	516-122 516-123	516-172 516-173	1: -10 2: -10	— —	— —	2 pcs.: 41.3, 131.4 mm, Setting ring (ø20 mm), Glove

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Metric Rectangular Gauge Blocks

- If using only one length repeatedly, it is suggested to purchase individual gauge blocks.
- Nominal sizes which are not included in the chart below can be supplied custom-made on request.
- Each Grade K gauge block to ISO/DIN/JIS, BS or ASME standard is supplied with a Certificate of Calibration which certifies that the gauge block was calibrated by interferometry.

SPECIFICATIONS

Metric Blocks

Length (mm)	Order No.*	
	Steel	CERA
0.1	**611821**	—
0.11	**611860**	—
0.12	**611861**	—
0.13	**611862**	—
0.14	**611863**	—
0.15	**611822**	—
0.16	**611864**	—
0.17	**611865**	—
0.18	**611866**	—
0.19	**611867**	—
0.2	**611823**	—
0.21	**611868**	—
0.22	**611869**	—
0.23	**611870**	—
0.24	**611871**	—
0.25	**611824**	—
0.26	**611872**	—
0.27	**611873**	—
0.28	**611874**	—
0.29	**611875**	—
0.3	**611825**	—
0.31	**611876**	—
0.32	**611877**	—
0.33	**611878**	—
0.34	**611879**	—
0.35	**611826**	—
0.36	**611880**	—
0.37	**611881**	—
0.38	**611882**	—
0.39	**611883**	—
0.4	**611827**	—
0.41	**611884**	—
0.42	**611885**	—
0.43	**611886**	—
0.44	**611887**	—
0.45	**611828**	—
0.46	**611888**	—
0.47	**611889**	—
0.48	**611890**	—
0.49	**611891**	—
0.5	**611506**	**613506**
0.51	**611892**	—
0.52	**611893**	—
0.53	**611894**	—
0.54	**611895**	—
0.55	**611896**	—
0.56	**611897**	—
0.57	**611898**	—
0.58	**611899**	—
0.59	**611900**	—
0.6	**611901**	—
0.61	**611902**	—
0.62	**611903**	—
0.63	**611904**	—
0.64	**611905**	—
0.65	**611906**	—
0.66	**611907**	—
0.67	**611908**	—
0.68	**611909**	—
0.69	**611910**	—
0.7	**611911**	—
0.71	**611912**	—
0.72	**611913**	—
0.73	**611914**	—
0.74	**611915**	—
0.75	**611916**	—
0.76	**611917**	—
0.77	**611918**	—
0.78	**611919**	—
0.79	**611920**	—
0.8	**611921**	—
0.81	**611922**	—
0.82	**611923**	—
0.83	**611924**	—
0.84	**611925**	—
0.85	**611926**	—
0.86	**611927**	—
0.87	**611928**	—
0.88	**611929**	—
0.89	**611930**	—
0.9	**611931**	—
0.91	**611932**	—
0.92	**611933**	—
0.93	**611934**	—
0.94	**611935**	—
0.95	**611936**	—
0.96	**611937**	—
0.97	**611938**	—
0.98	**611939**	—
0.99	**611940**	—
0.991	**611551**	**613551**
0.992	**611552**	**613552**
0.993	**611553**	**613553**
0.994	**611554**	**613554**
0.995	**611555**	**613555**
0.996	**611556**	**613556**
0.997	**611557**	**613557**
0.998	**611558**	**613558**
0.999	**611559**	**613559**
1	**611611**	**613611**
1.0005	**611520**	**613520**
1.001	**611521**	**613521**
1.002	**611522**	**613522**
1.003	**611523**	**613523**
1.004	**611524**	**613524**
1.005	**611525**	**613525**
1.006	**611526**	**613526**
1.007	**611527**	**613527**
1.008	**611528**	**613528**
1.009	**611529**	**613529**
1.01	**611561**	**613561**
1.02	**611562**	**613562**
1.03	**611563**	**613563**
1.04	**611564**	**613564**
1.05	**611565**	**613565**
1.06	**611566**	**613566**
1.07	**611567**	**613567**
1.08	**611568**	**613568**
1.09	**611569**	**613569**
1.1	**611570**	**613570**
1.11	**611571**	**613571**
1.12	**611572**	**613572**
1.13	**611573**	**613573**
1.14	**611574**	**613574**
1.15	**611575**	**613575**
1.16	**611576**	**613576**
1.17	**611577**	**613577**
1.18	**611578**	**613578**
1.19	**611579**	**613579**

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

PROPRIETARY INSPECTION CERTIFICATE

Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

An inspection certificate is supplied as standard. Refer to page E-4 for details.

*Suffix Number (-■■■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

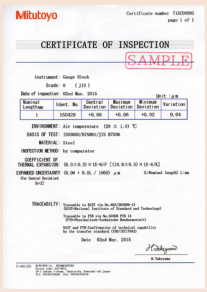
Suffix No.	Grade	Inspection Certificate	Calibration Certificate	
			JCSS	RvA
-016	K	O	O	—
-021	0	O	—	—
-026	0	O	O	—
-031	1	O	—	—
-036	1	O	O	—
-041	2	O	—	—
-046	2	O	O	—

ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-516	K	O	O
-521	00	O	—
-531	0	O	—
-541	1	O	—
-551	2	O	—

BS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-116	K	O	O
-121	0	O	—
-126	0	O	O
-131	1	O	—
-136	1	O	O
-141	2	O	—
-146	2	O	O


Mitutoyo
CERTIFICATE OF INSPECTION
SAMPLE

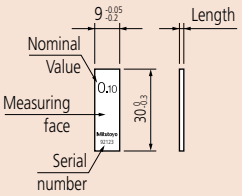
Inspection Certificate

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

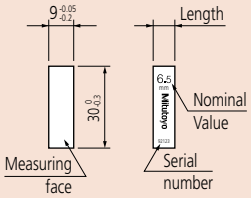
Dimensions

Unit: mm

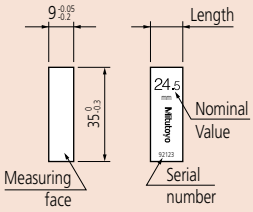
Nominal length:
0.1 mm - 5.5 mm
(0.004 in - 0.25 in)



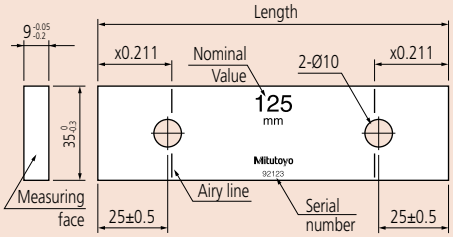
Nominal length:
6 mm - 10 mm
(0.3 in - 0.4 in)



Nominal length:
10.3 mm - 100 mm
(0.45 in - 4 in)



Nominal length 125 mm - 1000 mm (5 in - 20 in)



Length (mm)	Order No.* Steel	CERA
1.2	611580	613580
1.21	611581	613581
1.22	611582	613582
1.23	611583	613583
1.24	611584	613584
1.25	611585	613585
1.26	611586	613586
1.27	611587	613587
1.28	611588	613588
1.29	611589	613589
1.3	611590	613590
1.31	611591	613591
1.32	611592	613592
1.33	611593	613593
1.34	611594	613594
1.35	611595	613595
1.36	611596	613596
1.37	611597	613597
1.38	611598	613598
1.39	611599	613599
1.4	611600	613600
1.41	611601	613601
1.42	611602	613602
1.43	611603	613603
1.44	611604	613604
1.45	611605	613605
1.46	611606	613606
1.47	611607	613607
1.48	611608	613608
1.49	611609	613609
1.5	611641	613641
1.6	611516	613516
1.7	611517	613517
1.8	611518	613518
1.9	611519	613519
2	611612	613612
2.0005	611690	—
2.001	611691	—
2.002	611692	—
2.003	611693	—
2.004	611694	—
2.005	611695	—
2.006	611696	—
2.007	611697	—
2.008	611698	—
2.009	611699	—
2.01	611701	—
2.02	611702	—
2.03	611703	—
2.04	611704	—
2.05	611705	—
2.06	611706	—
2.07	611707	—
2.08	611708	—
2.09	611709	—
2.1	611710	—
2.11	611711	—
2.12	611712	—
2.13	611713	—
2.14	611714	—
2.15	611715	—
2.16	611716	—

Length (mm)	Order No.* Steel	CERA
2.17	611717	—
2.18	611718	—
2.19	611719	—
2.2	611720	—
2.21	611721	—
2.22	611722	—
2.23	611723	—
2.24	611724	—
2.25	611725	—
2.26	611726	—
2.27	611727	—
2.28	611728	—
2.29	611729	—
2.3	611730	—
2.31	611731	—
2.32	611732	—
2.33	611733	—
2.34	611734	—
2.35	611735	—
2.36	611736	—
2.37	611737	—
2.38	611738	—
2.39	611739	—
2.4	611740	—
2.41	611741	—
2.42	611742	—
2.43	611743	—
2.44	611744	—
2.45	611745	—
2.46	611746	—
2.47	611747	—
2.48	611748	—
2.49	611749	—
2.5	611642	613642
2.6	611750	—
2.7	611751	—
2.8	611752	—
2.9	611753	—
3	611613	613613
3.5	611643	613643
4	611614	613614
4.5	611644	613644
5	611615	613615
5.1	611850	613850
5.5	611645	613645
6	611616	613616
6.5	611646	613646
7	611617	613617
7.5	611647	613647
7.7	611851	613851
8	611618	613618
8.5	611648	613648
9	611619	613619
9.5	611649	613649
10	611671	613671
10.3	611852	613852
10.5	611650	613650
11	611621	613621
11.5	611651	613651
12	611622	613622
12.5	611652	613652
12.9	611853	613853

Length (mm)	Order No.* Steel	CERA
13	611623	613623
13.5	611653	613653
14	611624	613624
14.5	611654	613654
15	611625	613625
15.5	611655	613655
16	611626	613626
16.5	611656	613656
17	611627	613627
17.5	611657	613657
17.6	611854	613854
18	611628	613628
18.5	611658	613658
19	611629	613629
19.5	611659	613659
20	611672	613672
20.2	611855	613855
20.5	611660	613660
21	611631	613631
21.5	611661	613661
22	611632	613632
22.5	611662	613662
22.8	611856	613856
23	611633	613633
23.5	611663	613663
24	611634	613634
24.5	611664	613664
25	611635	613635
25.25	611754	613754
30	611673	613673
35	611755	613755
40	611674	613674
41.3	611857	613857
45	611756	613756
50	611675	613675
60	611676	613676
70	611677	613677
75	611801	613801
80	611678	613678
90	611679	613679
100	611681	613681
125	611802	613802
131.4	611858	613858
150	611803	613803
175	611804	613804
200	611682	613682
250	611805	613805
300	611683	613683
400	611684	613684
500	611685	613685
600	611840	—
700	611841	—
750	611842	—
800	611843	—
900	611844	—
1000	611845	—

Metric Wear Blocks

Length (mm)	Order No.* Tungsten carbide
1	612611
2	612612

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Inch Rectangular Gauge Blocks

SPECIFICATIONS

Inch Blocks

Length (inch)	Order No.*	
	Steel	CERA
0.004	**611304**	—
0.005	**611305**	—
0.006	**611306**	—
0.007	**611307**	—
0.008	**611308**	—
0.009	**611309**	—
0.01	**611310**	—
0.011	**611311**	—
0.012	**611312**	—
0.013	**611313**	—
0.014	**611314**	—
0.015	**611315**	—
0.016	**611316**	—
0.017	**611317**	—
0.018	**611318**	—
0.019	**611319**	—
0.02	**611320**	—
0.02005	**611240**	—
0.0201	**611231**	—
0.0202	**611232**	—
0.0203	**611233**	—
0.0204	**611234**	—
0.0205	**611235**	—
0.0206	**611236**	—
0.0207	**611237**	—
0.0208	**611238**	—
0.0209	**611239**	—
0.021	**611321**	—
0.022	**611322**	—
0.023	**611323**	—

Length (inch)	Order No.*	
	Steel	CERA
0.024	**611324**	—
0.025	**611325**	—
0.026	**611326**	—
0.027	**611327**	—
0.028	**611328**	—
0.029	**611329**	—
0.03	**611330**	—
0.031	**611331**	—
0.03125 (1/32)	**611101**	**613103**
0.032	**611332**	—
0.033	**611333**	—
0.034	**611334**	—
0.035	**611335**	—
0.036	**611336**	—
0.037	**611337**	—
0.038	**611338**	—
0.039	**611339**	—
0.04	**611340**	—
0.041	**611341**	—
0.042	**611342**	—
0.043	**611343**	—
0.044	**611344**	—
0.045	**611345**	—
0.046	**611346**	—
0.046875 (3/64)	**611102**	**613104**
0.047	**611347**	—
0.048	**611348**	—
0.049	**611349**	—
0.05	**611105**	**613105**
0.06	**611106**	—

Length (inch)	Order No.*	
	Steel	CERA
0.0625	**611303**	**613303**
0.07	**611107**	—
0.078125 (5/64)	**611103**	**613100**
0.08	**611108**	—
0.09	**611109**	—
0.09375 (3/32)	**611104**	**613101**
0.1	**611191**	**613191**
0.100025	**611111**	**613110**
0.10005	**611135**	**613135**
0.100075	**611112**	**613111**
0.1001	**611121**	**613121**
0.1002	**611122**	**613122**
0.1003	**611123**	**613123**
0.1004	**611124**	**613124**
0.1005	**611125**	**613125**
0.1006	**611126**	**613126**
0.1007	**611127**	**613127**
0.1008	**611128**	**613128**
0.1009	**611129**	**613129**
0.101	**611141**	**613141**
0.102	**611142**	**613142**
0.103	**611143**	**613143**
0.104	**611144**	**613144**
0.105	**611145**	**613145**
0.106	**611146**	**613146**
0.107	**611147**	**613147**
0.108	**611148**	**613148**
0.109	**611149**	**613149**
0.109375 (7/64)	**611110**	**613102**

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

PROPRIETARY INSPECTION CERTIFICATE

Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

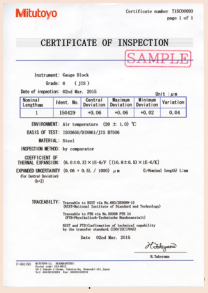
*Suffix Number (-■■■) for Selecting Standard and Certificate Provided

ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-516	K	O	O
-521	00	O	—
-531	0	O	—
-541	1	O	—
-551	2	O	—

BS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-121	0	O	—
-131	1	O	—
-141	2	O	—


Mitutoyo

CERTIFICATE OF INSPECTION

SAMPLE

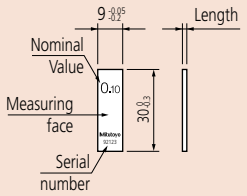
E

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

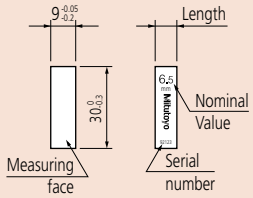
Dimensions

Unit: mm

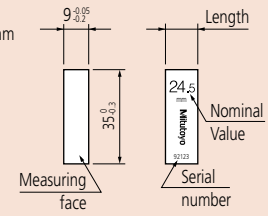
Nominal length:
0.1 mm - 5.5 mm
(0.004 in - 0.25 in)



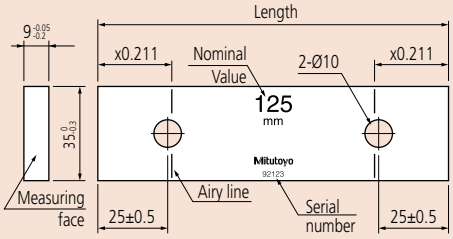
Nominal length:
6 mm - 10 mm
(0.3 in - 0.4 in)



Nominal length:
10.3 mm - 100 mm
(0.45 in - 4 in)



Nominal length 125 mm - 1000 mm (5 in - 20 in)



SPECIFICATIONS

Inch Blocks

Length (inch)	Order No.*	
	Steel	CERA
0.11	**611150**	**613150**
0.111	**611151**	**613151**
0.112	**611152**	**613152**
0.113	**611153**	**613153**
0.114	**611154**	**613154**
0.115	**611155**	**613155**
0.116	**611156**	**613156**
0.117	**611157**	**613157**
0.118	**611158**	**613158**
0.119	**611159**	**613159**
0.12	**611160**	**613160**
0.121	**611161**	**613161**
0.122	**611162**	**613162**
0.123	**611163**	**613163**
0.124	**611164**	**613164**
0.125	**611165**	**613165**
0.126	**611166**	**613166**
0.127	**611167**	**613167**
0.128	**611168**	**613168**
0.129	**611169**	**613169**
0.13	**611170**	**613170**
0.131	**611171**	**613171**
0.132	**611172**	**613172**
0.133	**611173**	**613173**
0.134	**611174**	**613174**
0.135	**611175**	**613175**
0.136	**611176**	**613176**
0.137	**611177**	**613177**
0.138	**611178**	**613178**

Length (inch)	Order No.*	
	Steel	CERA
0.139	**611179**	**613179**
0.14	**611180**	**613180**
0.141	**611181**	**613181**
0.142	**611182**	**613182**
0.143	**611183**	**613183**
0.144	**611184**	**613184**
0.145	**611185**	**613185**
0.146	**611186**	**613186**
0.147	**611187**	**613187**
0.148	**611188**	**613188**
0.149	**611189**	**613189**
0.15	**611115**	**613115**
0.16	**611116**	**613116**
0.17	**611117**	**613117**
0.18	**611118**	**613118**
0.19	**611119**	**613119**
0.2	**611192**	**613192**
0.21	**611221**	**613221**
0.25	**611212**	**613212**
0.3	**611193**	**613193**
0.315	**611209**	**613209**
0.35	**611213**	**613213**
0.375 (3/8)	**611113**	**613112**
0.4	**611194**	**613194**
0.420	**611210**	**613210**
0.45	**611214**	**613214**
0.5	**611195**	**613195**
0.55	**611215**	**613215**
0.6	**611196**	**613196**

Length (inch)	Order No.*	
	Steel	CERA
0.605	**611211**	**613211**
0.65	**611216**	**613216**
0.7	**611197**	**613197**
0.710	**611220**	**613220**
0.75	**611217**	**613217**
0.8	**611198**	**613198**
0.815	**611226**	**613226**
0.85	**611218**	**613218**
0.9	**611199**	**613199**
0.920	**611227**	**613227**
0.95	**611219**	**613219**
1	**611201**	**613201**
2	**611202**	**613202**
3	**611203**	**613203**
4	**611204**	**613204**
5	**611205**	**613205**
6	**611206**	**613206**
7	**611207**	**613207**
8	**611208**	**613208**
10	**611222**	**613222**
12	**611223**	**613223**
16	**611224**	**613224**
20	**611225**	**613225**

Inch Wear Blocks

Length (inch)	Order No.* Tungsten carbide
0.05	**612105**
0.1	**612191**

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.
4 inch or more is not listed in the standard of British Standards Institution.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Rectangular Gauge Block Accessories SERIES 516

- To expand the range of rectangular gauge block (steel and CERA) applications, Mitutoyo offers the gauge block accessories set. By assembling the items in the set, together with a stack of gauge blocks, you can easily and quickly build up a precision gage.

516-601
(22 pcs)

516-602
(14 pcs)

SPECIFICATIONS

Item Description	Item Order No.	Nominal capacity/ dimension (mm)	Set		Qty
			22 pcs **516-601**	14 pcs **516-602**	
Holder	**619002**	15 to 60	—	✔	1 pc.
	619003	5 to 100	✔	✔	
	619004	15 to 160	✔	✔	
	619005	20 to 250	✔	✔	
Base	**619009**	35	✔	✔	
Half-round jaw	**619010**	2	✔	✔	One pair (2 pcs)
	619011	5	✔	✔	
	619012	8	✔	✔	
	619013	12	✔	—	
	619014	20	✔	—	
Plain jaw	**619018**	160	✔	—	
Scriber point	**619019**	—	✔	✔	1 pc.
Center point	**619020**	—	✔	✔	
Tram point	**619021**	—	✔	—	One pair (2 pcs)
Triangular straightedge	**619022**	100	✔	✔	1 pc.
	619023	160	✔	—	

Note: Only 1 pc is supplied for each Order No., except for the half-round jaws, plain jaws and tram points, which are supplied as a pair (2 pcs).

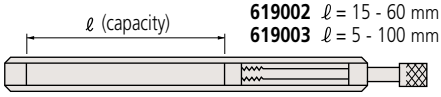
Gaging a bore using a pair of half-round jaws and a holder

Marking a workpiece using the base, a holder and the scriber point

Setting a bore gage using a holder with a pair of Type I half-round jaws arranged as flat contact surfaces

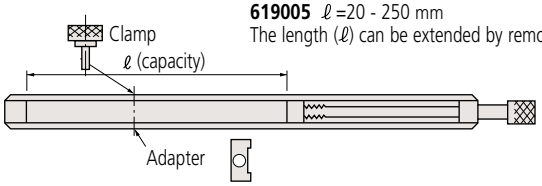
Holder

Thickness = 15 mm
Width = 29.5 mm

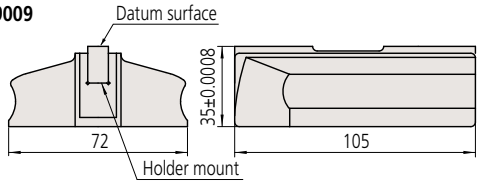


619002 ℓ = 15 - 60 mm
619003 ℓ = 5 - 100 mm

619004 ℓ =15 - 160 mm
619005 ℓ =20 - 250 mm
The length (ℓ) can be extended by removing the adapter.



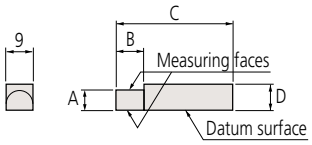
Base **619009**



Flatness of the datum surface 0.5 µm
Flatness of the bottom surface 1 µm

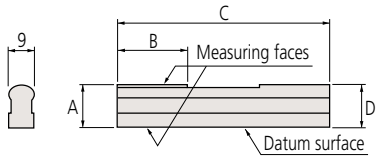
Half-round jaw

Type I



Flatness of the datum surface 0.5 µm

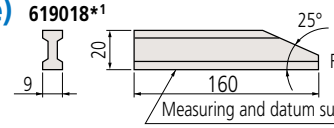
Type II



Unit: mm

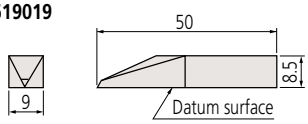
Order No.	Type	Size	A	B	C	D
619010*1	I	2	2±0.0005	5.5	40	7.5
619011*1		5	5±0.0005	15.5	45	7.5
619012*1		8	8±0.0005	20	50	8.5
619013*1	II	12	12±0.0005	25	75	13
619014*1		20	20±0.0005	25	125	20.5

Plain jaw (B type) **619018***1



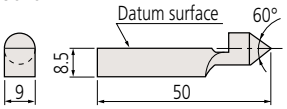
Flatness of the datum surface 1 µm

Scriber point **619019**



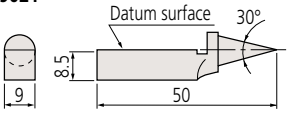
Flatness of the datum surface 0.5 µm

Center point **619020**



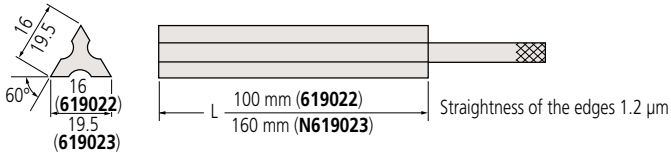
Eccentricity tolerance of the point ±10 µm
Flatness of the datum surface 0.5 µm

Tram point **619021***1



Eccentricity tolerance of the point ±10 µm
Flatness of the datum surface 0.5 µm

Triangular straightedge (for handheld use only)



Straightness of the edges 1.2 µm

*1 Qty: One pair (2 pcs)

E

Mitutoyo

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Accessories for Rectangular Gauge Blocks over 100 mm SERIES 516

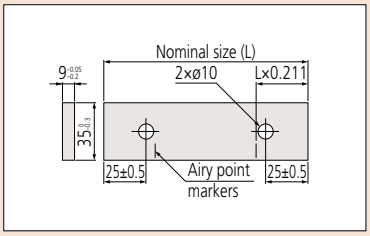
- Specially designed for long rectangular gauge blocks of 100 mm and over which have two coupling holes in the body: coupling of two long gauge blocks, a stack of regular gauge blocks and attachment of jaws is possible.
- These accessories can be used for long steel or CERA blocks.

516-605
(14 pcs)

SPECIFICATIONS

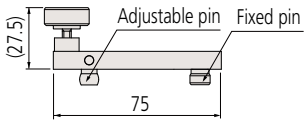
Set Order No.	Individual Item Order No.	Item Description	Quantity Supplied
516-605	619031	Connector A	1 pc.
	619032	Connector B	
	619033	Connector C	
	619034	Connector D	
	619035	Connector E	
	619036	Adapter	3 pcs.
	619009	Base	1 pc.
	619013	Half-round jaw	2 pcs.
	619018	Plain jaw	
	619019	Scriber point	1 pc.

Note: Only 1 pc is supplied for each Order No., except for the half-round jaws and plain jaws, which are supplied as a pair (2 pcs).

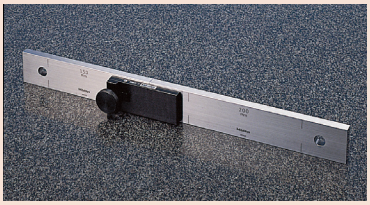


Coupling holes in long gauge blocks

Connector A 619031

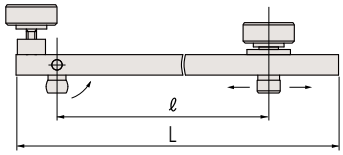


Used for directly coupling two long gauge blocks.



Using an A-type connector

Connectors B and C

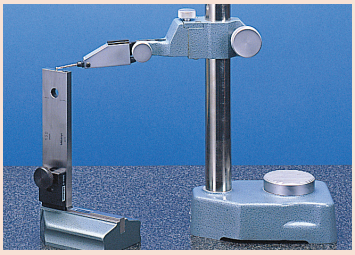


	Order No.	ℓ (max.)	L	Adapter Qty
Connector B	619032	90 mm	126 mm	2
Connector C	619033	200 mm	236 mm	

Adapter **619036**

Used for clamping jaws to the ends of one or more long gauge blocks in conjunction with adapters (619036). The length ℓ is highly adjustable to accommodate the variable length of a stack of regular gauge blocks that would be wrung to one of the long gauge blocks to achieve the required gaging size.

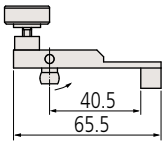
Use of B-type connectors in gauge construction



Setting a dial test indicator to a long-gauge-block stack attached to the base with a D-type connector

Connector D

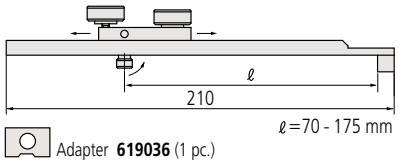
619034



Used for attaching a long gauge block directly to the base.

Connector E

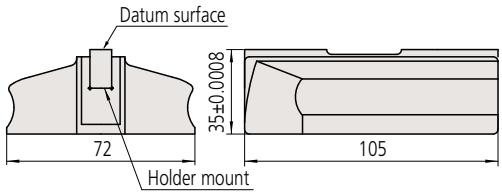
619035



Used for attaching a long gauge block to the base over a stack of regular gauge blocks wrung between the base and long gauge block. The length ℓ is highly adjustable to accommodate the variable length of the stack.

Base

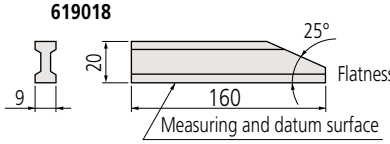
619009



Flatness of the datum surface 0.5 µm
Flatness of the bottom surface 1 µm

Plain jaw

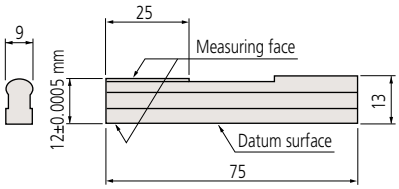
619018



Flatness of the datum surface 1 µm

Half-round jaw

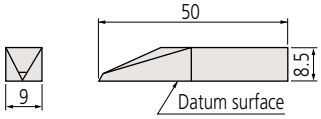
619013



Flatness of the datum surface 0.5 µm

Scriber point

619019



Flatness of the datum surface 0.5 µm

Example of use of accessories with long gauge blocks

The table below shows the appropriate combination of long rectangular gauge blocks and accessories for making inside and outside measurements in the approximate range 300 mm to 1000 mm in 100 mm steps.
Note that the ranges shown do not take into account the combined thickness of the half-round jaws for inside measurement (24 mm) and the length of any regular gauge block stack used.

Items		Order No.	300 mm		400 mm		500 mm		600 mm		700 mm		800 mm		900 mm		1000 mm	
			Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Inner	Inner	Outer	Inner	Outer	Inner	Outer
Rectangular gauge block (nominal dimension)	**200 mm**	**611682**							1	1								
	300 mm	**611683**	1	1							1	1	1	1				
	400 mm	**611684**			1	1			1	1	1	1			1	1		
	500 mm	**611685**					1	1					1	1	1	1	2	2
Connector A		**619031**							1	1	1	1	1	1	1	1	1	1
Connector B*		**619032**	2		2		2		2		2		2		2		2	
Half-round jaws 2 pcs/set		**619013**	2		2		2		2		2		2		2		2	
Adapter		**619036**	(2)		(2)		(2)		(2)		(2)		(2)		(2)		(2)	

* Provided with adapters (2 pcs)

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

Metric/Inch Square Gauge Block Sets
SERIES 516 — Metric Block Sets, Long Block Sets, Wear Block Sets

- Square gauge block sets have several unique characteristics (refer to page E-4 for details.). A wide choice is provided to best match the target applications: sets containing from 2 to 112 blocks are available.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.

Steel 112-block set

Steel 103-block set

Steel 76-block set

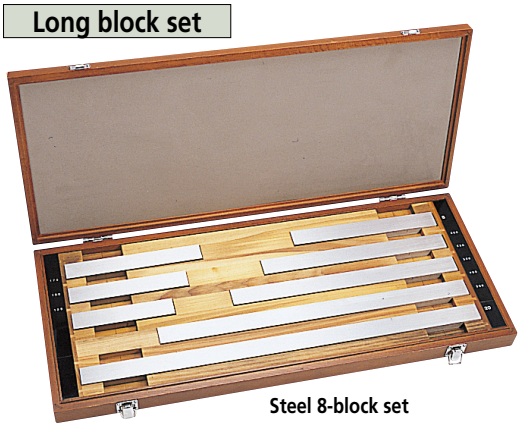
Steel 47-block set

Steel 32-block set

Wear block set

Tungsten Carbide 2-block set

Long block set



Steel 8-block set

The wear to a frequently used square gauge block set can be drastically reduced by using tungsten-carbide wear blocks on the ends of a stack. There are two types available, of nominal dimensions 1 mm and 2 mm. These blocks are much more wear-resistant than steel blocks, and they also absorb most of the wear that would otherwise occur to the blocks in the set due to contact, and therefore maximize the set's longevity. Wear blocks are relatively inexpensive and can be readily discarded when no longer serviceable. To achieve maximum protection, the same face of each wear block should always be wrung to a set block, so the opposite, wearing, face never touches a set block.

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

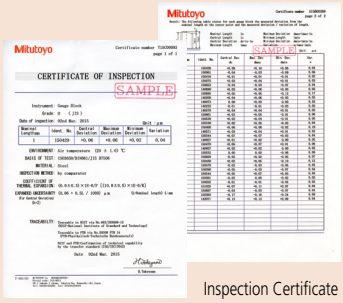
*Suffix Number (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—
6	O	O

ASME

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	O	—



Inspection Certificate

SPECIFICATIONS

Metric Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available ISO/DIN/JIS	Standard / grade available ASME	Blocks included in set Size	Step	Qty.
112	516-437	—	—	00: -■6	1.005		1
	516-438	—	0: -■0	0: -■6	1.001 - 1.009	0.001	9
	516-439	—	1: -■0	1: -■6	1.01 - 1.49	0.01	49
	516-440	—	2: -■0	2: -■6	0.5 - 24.5	0.5	49
	—	—	—	—	25 - 100	25	4
103	516-441	—	—	00: -■6	1.005		1
	516-442	—	0: -■0	0: -■6	1.01 - 1.49	0.01	49
	516-443	—	1: -■0	1: -■6	0.5 - 24.5	0.5	49
	516-444	—	2: -■0	2: -■6	25 - 100	25	4
76	516-449	—	—	00: -■6	1.005		1
	516-450	—	0: -■0	0: -■6	1.01 - 1.49	0.01	49
	516-451	—	1: -■0	1: -■6	0.5 - 9.5	0.5	19
	516-452	—	2: -■0	2: -■6	10 - 40	10	4
	—	—	—	—	50 - 100	25	3
47	516-457	—	—	00: -■6	1.005		1
	516-458	—	0: -■0	0: -■6	1.01 - 1.09	0.01	9
	516-459	—	1: -■0	1: -■6	1.1 - 1.9	0.1	9
	516-460	—	2: -■0	2: -■6	1 - 24	1	24
		—	—	—	25 - 100	25	4
32	516-465	—	—	00: -■6	1.005		1
	516-466	—	0: -■0	0: -■6	1.01 - 1.09	0.01	9
	516-467	—	1: -■0	1: -■6	1.1 - 1.9	0.1	9
	516-468	—	2: -■0	2: -■6	1 - 9	1	9
	—	—	—	—	10 - 30	10	3
	—				60		1

Metric Long Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available ISO/DIN/JIS	Standard / grade available ASME	Blocks included in set Size	Step	Qty.
8	516-751	—	—	00: -■6	125, 150, 175	25	3
	516-752	—	0: -■0	0: -■6	200, 250	50	2
	516-753	—	1: -■0	1: -■6	300, 400, 500	100	3
	516-754	—	2: -■0	2: -■6			

Metric Wear Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available ISO/DIN/JIS	Standard / grade available ASME	Blocks included in set Size	Step	Qty.
2	516-820	—	0: -■0	—	1	—	2
	516-821	—	1: -■0	—			
2	516-822	—	0: -■0	—	2	—	2
	516-823	—	1: -■0	—			

Inch Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available ISO/DIN/JIS	Standard / grade available ASME	Blocks included in set Size	Step	Qty.
81	516-401	516-201	—	00: -■6	0.1001 - 0.1009	0.0001	9
	516-402	516-202	—	0: -■6	0.101 - 0.149	0.001	49
	516-403	516-203	—	1: -■6	0.05 - 0.95	0.05	19
	516-404	516-204	—	2: -■6	1 - 4	1	4
36	516-421	516-221	—	00: -■6	0.05 in		1
	516-422	516-222	—	0: -■6	0.1001 - 0.1009	0.0001	9
	516-423	516-223	—	1: -■6	0.101 - 0.109	0.001	9
	516-424	516-224	—	2: -■6	0.11 - 0.19	0.01	9
	—	—	—	—	0.1 - 0.5	0.1	5
	—	—	—	—	1, 2, 4	1	3
28	516-417	—	—	00: -■6	0.02005		1
	516-418	—	—	0: -■6	0.0201-0.0209	0.0001	9
	516-419	—	—	1: -■6	0.021-0.029	0.001	9
	516-420	—	—	2: -■6	0.010-0.090	0.01	9
	—		—	—			

Inch Long Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard / grade available ISO/DIN/JIS	Standard / grade available ASME	Blocks included in set Size	Step	Qty.
8	516-762	—	—	0: -■0	5 - 7	1	3
	516-763	—	—	1: -■0	8, 10, 12	2	3
	—	—	—		16, 20	4	2

Inch Wear Block Sets

Blocks per set	Order No. Carbide	Order No. CERA	Standard / grade available ISO/DIN/JIS	Standard / grade available ASME	Blocks included in set Size	Step	Qty.
2	516-824	516-846	—	0: -■0	0.05	—	2
	516-825	516-847	—	1: -■0			
2	516-826	516-844	—	0: -■0	0.1	—	2
	516-827	516-845	—	1: -■0			

E

Mitutoyo

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Metric Square Gauge Blocks

- Purchasing individual metric square gauge blocks is a cost-effective way to replace heavily used sizes.
- Please add the suffix number representing the national standard and grade required at the end of the Order No. when ordering these items.
- Special sizes that are not included in the charts can be supplied custom-made on request.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.

SPECIFICATIONS

Metric Blocks

Length (mm)	Order No.* Steel	CERA
0.5	**614506**	—
1	**614611**	—
1.0005	**614520**	—
1.001	**614521**	—
1.002	**614522**	—
1.003	**614523**	—
1.004	**614524**	—
1.005	**614525**	—
1.006	**614526**	—
1.007	**614527**	—
1.008	**614528**	—
1.009	**614529**	—
1.01	**614561**	—
1.02	**614562**	—
1.03	**614563**	—
1.04	**614564**	—
1.05	**614565**	—
1.06	**614566**	—
1.07	**614567**	—
1.08	**614568**	—
1.09	**614569**	—
1.1	**614570**	—
1.11	**614571**	—
1.12	**614572**	—
1.13	**614573**	—
1.14	**614574**	—
1.15	**614575**	—
1.16	**614576**	—
1.17	**614577**	—
1.18	**614578**	—
1.19	**614579**	—
1.2	**614580**	—
1.21	**614581**	—
1.22	**614582**	—
1.23	**614583**	—
1.24	**614584**	—
1.25	**614585**	—
1.26	**614586**	—
1.27	**614587**	—
1.28	**614588**	—
1.29	**614589**	—
1.3	**614590**	—
1.31	**614591**	—
1.32	**614592**	—
1.33	**614593**	—
1.34	**614594**	—
1.35	**614595**	—
1.36	**614596**	—
1.37	**614597**	—
1.38	**614598**	—
1.39	**614599**	—
1.4	**614600**	—
1.41	**614601**	—
1.42	**614602**	—
1.43	**614603**	—
1.44	**614604**	—
1.45	**614605**	—
1.46	**614606**	—
1.47	**614607**	—
1.48	**614608**	—
1.49	**614609**	—
1.5	**614641**	—
1.6	**614516**	—
1.7	**614517**	—
1.8	**614518**	—
1.9	**614519**	—
2	**614612**	—
2.5	**614642**	—
3	**614613**	—
3.5	**614643**	—
4	**614614**	—
4.5	**614644**	—
5	**614615**	—
5.5	**614645**	—
6	**614616**	—
6.5	**614646**	—
7	**614617**	—
7.5	**614647**	—
8	**614618**	—
8.5	**614648**	—
9	**614619**	—
9.5	**614649**	—
10	**614671**	—
10.5	**614650**	—
11	**614621**	—
11.5	**614651**	—
12	**614622**	—
12.5	**614652**	—
13	**614623**	—
13.5	**614653**	—
14	**614624**	—
14.5	**614654**	—
15	**614625**	—
15.5	**614655**	—
16	**614626**	—
16.5	**614656**	—
17	**614627**	—
17.5	**614657**	—
18	**614628**	—
18.5	**614658**	—
19	**614629**	—
19.5	**614659**	—
20	**614672**	—
20.5	**614660**	—
21	**614631**	—
21.5	**614661**	—
22	**614632**	—
22.5	**614662**	—
23	**614633**	—
23.5	**614663**	—
24	**614634**	—
24.5	**614664**	—
25	**614635**	—
30	**614673**	—
40	**614674**	—
50	**614675**	—
60	**614676**	—
75	**614801**	—
100	**614681**	—
125	**614802**	—
150	**614803**	—
175	**614804**	—
200	**614682**	—
250	**614805**	—
300	**614683**	—
400	**614684**	—
500	**614685**	—

Metric Wear Blocks

Length (mm)	Order No. Tungsten carbide
1	**615611**
2	**615612**

Note: Details of the overall sizes for forms of block are given on page E-3 and E-24, and the accuracy standards to which they are manufactured are given on page E-5.

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

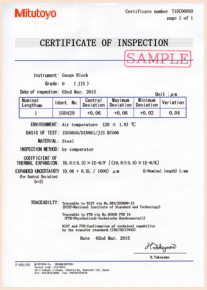
*Suffix Number (-■■■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-021	0	O	—
-026	0	O	O
-031	1	O	—
-036	1	O	O
-041	2	O	—
-046	2	O	O

ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-521	00	O	—
-531	0	O	—
-541	1	O	—
-551	2	O	—



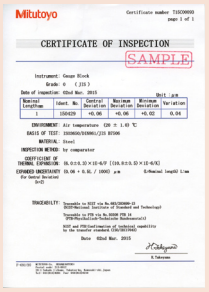
Inspection Certificate

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

*Suffix Number (-■■■) for Selecting Grade and Certificate Provided

ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-521	00	O	—
-531	0	O	—
-541	1	O	—
-551	2	O	—

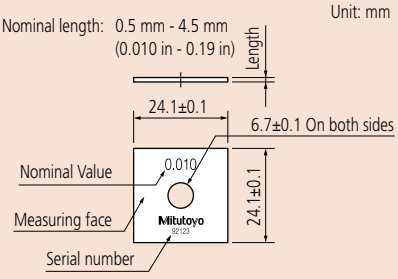


Inspection Certificate

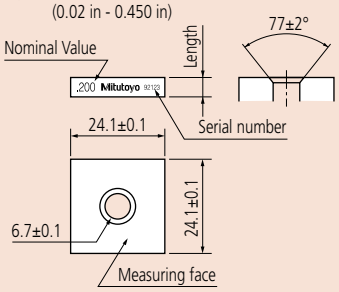
Dimensions

Unit: mm

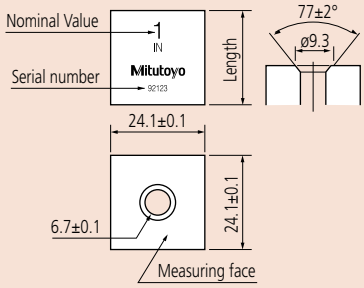
Nominal length: 0.5 mm - 4.5 mm (0.010 in - 0.19 in)



Nominal length: 5 mm - 14.5 mm (0.02 in - 0.450 in)



Nominal length: 15 mm - 500 mm (0.500 in - 20 in)



Individual Inch Square Gauge Blocks

SPECIFICATIONS

Inch Blocks

Length (inch)	Order No.* Steel	CERA
0.01	**614310**	—
0.02005	**614240**	—
0.0201	**614231**	—
0.0202	**614232**	—
0.0203	**614233**	—
0.0204	**614234**	—
0.0205	**614235**	—
0.0206	**614236**	—
0.0207	**614237**	—
0.0208	**614238**	—
0.0209	**614239**	—
0.02	**614320**	—
0.021	**614321**	—
0.022	**614322**	—
0.023	**614323**	—
0.024	**614324**	—
0.025	**614325**	—
0.026	**614326**	—
0.027	**614327**	—
0.028	**614328**	—
0.029	**614329**	—
0.03	**614330**	—
0.03125 (1/32)	**614301**	—
0.04	**614340**	—
0.046875 (3/64)	**614302**	—
0.05	**614105**	**616105**
0.06	**614106**	—
0.0625	**614303**	**616303**
0.07	**614107**	—
0.078125 (5/64)	**614304**	—
0.08	**614108**	—
0.09	**614109**	—
0.09375 (3/32)	**614305**	—
0.1	**614191**	**616191**
0.100025	**614307**	—
0.10005	**614135**	**616135**
0.100075	**614308**	—
0.1001	**614121**	**616121**
0.1002	**614122**	**616122**
0.1003	**614123**	**616123**
0.1004	**614124**	**616124**
0.1005	**614125**	**616125**
0.1006	**614126**	**616126**
0.1007	**614127**	**616127**
0.1008	**614128**	**616128**
0.1009	**614129**	**616129**
0.101	**614141**	**616141**
0.102	**614142**	**616142**
0.103	**614143**	**616143**
0.104	**614144**	**616144**
0.105	**614145**	**616145**

Length (inch)	Order No.* Steel	CERA
0.106	**614146**	**616146**
0.107	**614147**	**616147**
0.108	**614148**	**616148**
0.109	**614149**	**616149**
0.109375 (7/64)	**614306**	—
0.11	**614150**	**616150**
0.111	**614151**	**616151**
0.112	**614152**	**616152**
0.113	**614153**	**616153**
0.114	**614154**	**616154**
0.115	**614155**	**616155**
0.116	**614156**	**616156**
0.117	**614157**	**616157**
0.118	**614158**	**616158**
0.119	**614159**	**616159**
0.12	**614160**	**616160**
0.121	**614161**	**616161**
0.122	**614162**	**616162**
0.123	**614163**	**616163**
0.124	**614164**	**616164**
0.125	**614165**	**616165**
0.126	**614166**	**616166**
0.127	**614167**	**616167**
0.128	**614168**	**616168**
0.129	**614169**	**616169**
0.13	**614170**	**616170**
0.131	**614171**	**616171**
0.132	**614172**	**616172**
0.133	**614173**	**616173**
0.134	**614174**	**616174**
0.135	**614175**	**616175**
0.136	**614176**	**616176**
0.137	**614177**	**616177**
0.138	**614178**	**616178**
0.139	**614179**	**616179**
0.14	**614180**	**616180**
0.141	**614181**	**616181**
0.142	**614182**	**616182**
0.143	**614183**	**616183**
0.144	**614184**	**616184**
0.145	**614185**	**616185**
0.146	**614186**	**616186**
0.147	**614187**	**616187**
0.148	**614188**	**616188**
0.149	**614189**	**616189**
0.15	**614115**	**616115**
0.16	**614116**	**616116**
0.17	**614117**	**616117**
0.18	**614118**	**616118**
0.19	**614119**	**616119**
0.2	**614192**	**616192**

Length (inch)	Order No.* Steel	CERA
0.25	**614212**	**616212**
0.3	**614193**	**616193**
0.35	**614213**	**616213**
0.375 (3/8)	**614309**	—
0.4	**614194**	**616194**
0.45	**614214**	**616214**
0.5	**614195**	**616195**
0.55	**614215**	**616215**
0.6	**614196**	**616196**
0.65	**614216**	**616216**
0.7	**614197**	**616197**
0.75	**614217**	**616217**
0.8	**614198**	**616198**
0.85	**614218**	**616218**
0.9	**614199**	**616199**
0.95	**614219**	**616219**
1	**614201**	**616201**
2	**614202**	**616202**
3	**614203**	**616203**
4	**614204**	**616204**
5	**614205**	—
6	**614206**	—
7	**614207**	—
8	**614208**	—
10	**614222**	—
12	**614223**	—
16	**614224**	—
20	**614225**	—

Inch Wear Blocks

Length (inch)	Order No.* Tungsten carbide
0.05	**615105**
0.1	**615191**

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

E

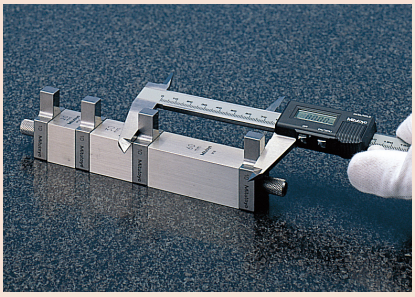
Gauge Blocks

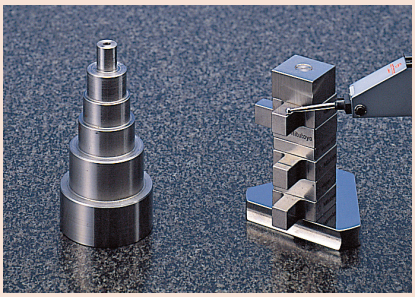
Length Standards Brought to You by Mitutoyo

Square Gauge Block Accessories Set

- To expand the application of square gauge blocks, Mitutoyo offers the Gauge Block Accessories Set. Square gauge blocks have a much broader range of application than rectangular gauge blocks due to the central clamping hole. Also, the accessories included in the set are sold individually depending on the application.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.

516-611





SPECIFICATIONS

Metric

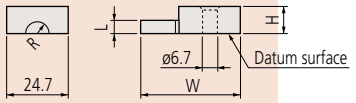
Order No. 516-611	Included in set	Quantity Supplied
619070	Half-round jaw	2 pcs.
619071	Half-round jaw	
619072	Plain jaw	
619073	Center point	1 pc.
619054	Scriber point	
619074	Base	
619057	Flat head screw	2 pcs.
619058	Flat head screw	
619059	Slotted head nut	
619060	Adjustable tie rod	
619061	Adjustable tie rod	
619062	Tie rod	1 pc.
619063	Tie rod	
619064	Tie rod	
619065	Tie rod	
619056	Stud	2 pcs.
619066	Knurled head screw	

Inch

Order No. 516-612	Included in set	Quantity Supplied
619050	Half-round jaw	2 pcs.
619051	Half-round jaw	
619052	Plain jaw	
619053	Center point	1 pc.
619054	Scriber point	
619055	Base	
619057	Flat head screw	2 pcs.
619058	Flat head screw	
619059	Slotted head nut	
619060	Adjustable tie rod	
619061	Adjustable tie rod	
619062	Tie rod	1 pc.
619063	Tie rod	
619064	Tie rod	
619065	Tie rod	
619056	Stud	2 pcs.
619066	Knurled head screw	

* 2 pcs of half-round jaw, plain jaw, stud, flat head screw, slotted head nut, adjustable tie rod, and knurled head screw are included in each set. Please note that the abovementioned Order No. indicates only 1 set.

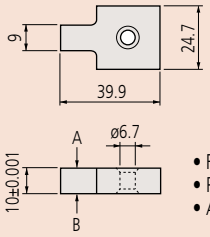
Half-round jaw



Order No.	R	L	W	H
619070	1.95 mm	2 mm	33.6 mm	5.3 mm
619071	4.95 mm	5 mm	39.9 mm	10.3 mm

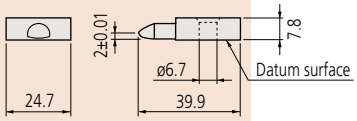
- Flatness 0.5 µm
- Parallelism of L 0.5 µm
- Tolerance of L ±0.5 µm

Plain jaw 619072



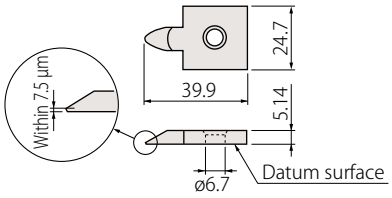
- Flatness 0.12 µm
- Parallelism 0.12 µm
- A and B are datum surfaces

Center point 619073



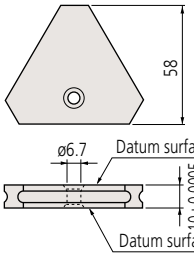
- Flatness 0.5 µm

Scriber point 619054



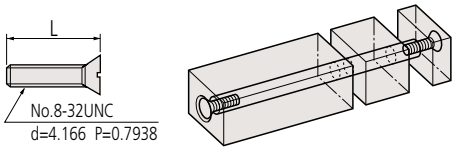
- Flatness of datum surface 0.5 µm

Base 619074



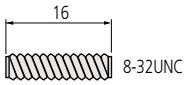
- Parallelism 1.5 µm
- Flatness 1.5 µm
  (The surface within 1.5 mm of edge is excluded)

Flat head screw

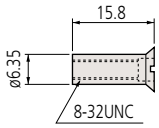


Order No.	L
619057	31.6 mm
619058	15.8 mm

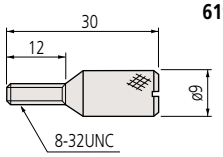
Stud 619056



Slotted head nut 619059



Knurled head screw 619066

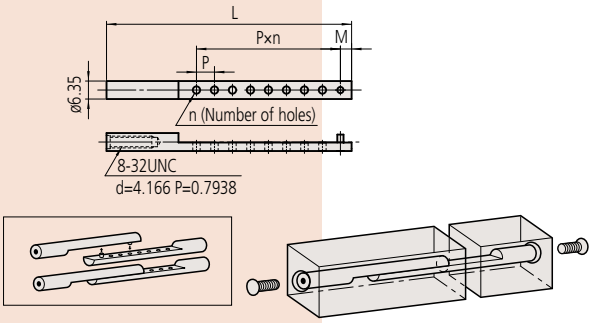


•Contraction caused by the clamping force

The minimum recommended torque to be applied to the clamping screws is approximately 600 mN/m. The chart below shows the approximate length contraction of a 100 mm gauge stack using typical torque values.

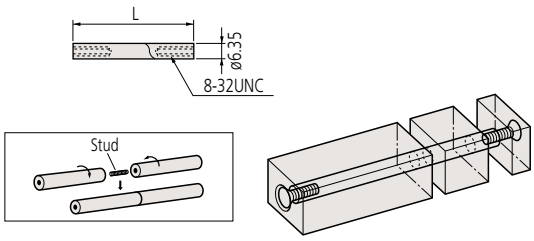
Driver	Contraction
Torque Driver 600 mN·m	0.2 µm/100 mm
Ordinary Driver 700 - 800 mN·m	0.3 µm/100 mm

Adjustable tie rod



Order No.	L	M	P	n
619060	124.5 mm	3.85 mm	6.35 mm	14
619061	86.5 mm	3.95 mm	6.35 mm	8

Tie rod



Order No.	L
619065	19 mm
619064	38 mm
619063	57 mm
619062	76 mm

Accessories used for combining square gauge blocks

Overall length (mm)		Min.	21	36	34	41	45	58	64	72	77	82	91	95	109	117	130	148	121	167	143	160	205	180	223	240	258	295	375
Order No.	Included in set	Max.	30	43	43	50	60	72	79	88	91	97	107	109	125	135	150	169	180	184	210	255	270	285	288	345	363	445	520
619059	Slotted head nut		1	1		1																							
619058	Flat head screw		1		2	1	2	1	2		1	2		1		1			2			2							
619057				1				1		2	1		2	1	2	1	2	2		2	2		2	2	2	2	2	2	2	2
619056	Stud					1										1	1	1		1			1		1	1	1	1	2
619065	Tie rod				1	1										1	1												
619064							1	1		1								1												
619063									1		1		1							1										
619062												1		1	1	1	1	1		1										
619061	Adjustable tie rod																		2		2		2		2			2	2
619060																						2		2		2	2	2	2

E

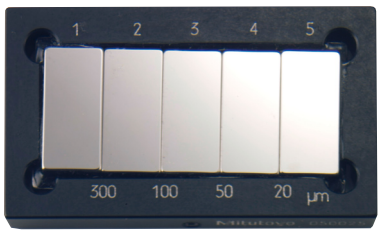
Gauge Blocks

Length Standards Brought to You by Mitutoyo

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

Step Master
SERIES 516

- The Step Master is a gauge providing 4 small increments in height (steps) constructed from an assembly of 5 highly accurate steel or ceramic blocks.
- Each step is defined as the difference in height between the center of adjacent blocks, measured to a resolution of 0.01 µm by using an interferometer with an accuracy tolerance of ±0.20 µm.
- Steel and ceramic types are available to suit the application.
- Height differences are measured between the centers of adjacent steps.



Steel type
516-199

Ceramic type
516-499

SPECIFICATIONS

Steel type

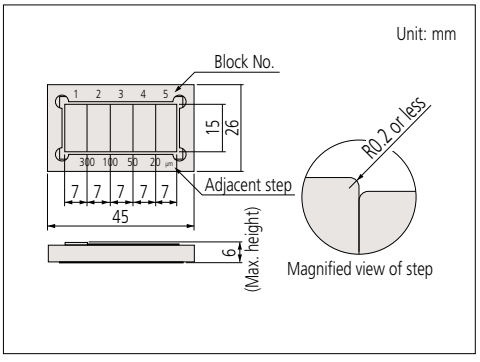
Order No.	516-198					516-199				
Block No.	1	2	3	4	5	1	2	3	4	5
Cumulative step (µm)	0	10	15	17	18	0	300	400	450	470
Step value between adjacent blocks (µm)		10	5	2	1		300	100	50	20

Ceramic type

Order No.	516-498					516-499				
Block No.	1	2	3	4	5	1	2	3	4	5
Cumulative step (µm)	0	10	15	17	18	0	300	400	450	470
Step value between adjacent blocks (µm)		10	5	2	1		300	100	50	20

○○○ - ○○○ **-64**: Provided with Calibration Certificate
○○○ - ○○○ **-84**: Provided with Calibration Certificate and Traceability System Chart

DIMENSIONS

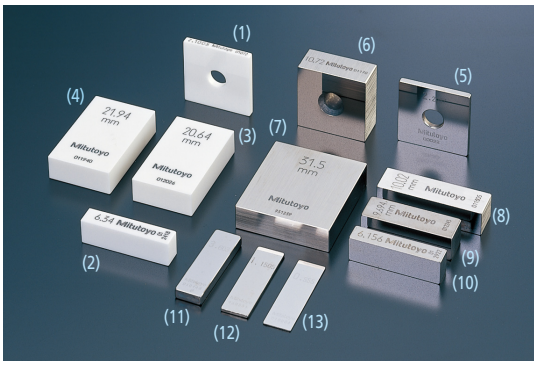


Custom-made Blocks & Gages

- Typical examples of custom-made gauge blocks and reference gages.
  Mitutoyo can manufacture Gauge Blocks and reference gages to your size and design.
- Nominal size range
  · 0.1 mm to 1000 mm (steel)
  · 0.5 mm to 500 mm (ceramic)
- Nominal size increment
  · 0.0005 mm (up to 100 mm)
  · 0.001 mm (over 100 mm)
- Cross section (same as the standard product)
  · Nominal length of 10 mm or less: 30 x 9 mm
  · Nominal length of more than 10 mm: 35 x 9 mm
  · Square types are also available.
- Special Gauge
  Gauge Blocks and reference gages to your specifications (section dimensions) are available, including precision spacers which normally absorb much time and effort to manufacture in-house. Special processing including boring, step gaging and special marking are available. Consult us for details.
- Special stepped master
  We make special stepped masters based on the requested adjacent step.

Notes on "extension hole" on the special size gauge block:
· Steel, from 100 mm to less than 500 mm
  Without extension hole
  (If needed, please notify.)
· Steel, from 500 mm to less than 1000 mm
  With extension hole
  (If not needed, please notify.)
· Ceramic, from 100 mm to less than 500 mm
  With extension hole
  (If not needed, please notify.)

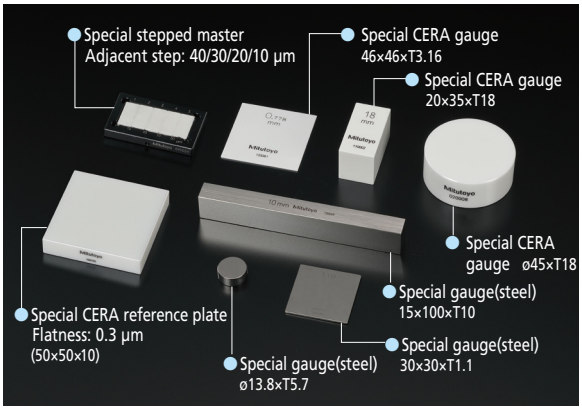
Typical examples of custom-made gauge blocks and reference gages.
Please enquire for price and delivery times for your particular requirements.



Ceramic
(1) Square gauge block (2.1005 mm)
(2) Rectangular gauge block (6.34 mm)
(3) Rectangular gauge block (20.64 mm)
(4) Rectangular gauge block (21.94 mm)

Steel
(5) Square gauge block (2.2065 mm)
(6) Square gauge block (10.72 mm)
(7) Rectangular gauge block (31.5 mm)
(8) Rectangular gauge block (10.02 mm)
(9) Rectangular gauge block (9.694 mm)
(10) Rectangular gauge block (6.156 mm)
(11) Rectangular gauge block (3.603 mm)
(12) Rectangular gauge block (1.1505 mm)
(13) Rectangular gauge block (0.555 mm)

Special gauge (T: nominal), Special stepped master



E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Maintenance Kit for Gauge Blocks SERIES 516

- Maintenance kit for gauge blocks includes all the necessary maintenance tools for removing burrs and contamination, and applying anti-corrosion treatment after use.

516-650E

Order No. 516-650E
Tools and accessories included:

1. Ceraston (**601645**)
   (both sides finished by lapping)

2. Optical flat (**158-117**)
   (ø45, 12 mm thickness, Flatness 0.2 µm)
   Used to check the wringing of thin gauge blocks and for the presence of burrs.

3. Tweezers (**600004**)
   Used for handling thin gauge blocks.

4. Blower brush (**600005**)
   Used for blowing dust from measuring surfaces.

5. Cleaning paper (**600006**)
   (lens paper, 82 x 304 mm, 500 pcs)
   Used for wiping off rust preventive oil and contamination. Lint free.

6. Artificial leather mat (B4 size) (**600007**)
   Used as a gauge block mat in order to avoid scratches on the work table

7. Reagent bottle (**600008**)
   (polyethylene container, 100 ml)
   Bottle of wiping solution.
   (Mitutoyo employs n-Heptane for solvent.)

8. Gloves (**600009**)
   Used for handling large gauge blocks. Effective for the prevention of corrosion and thermal expansion.

Recommendation for regular calibration

Gauge blocks are often used to define a company's standard of length for manufacturing and as such must be reliable. This means that they need regular calibration to verify accuracy. (The problem of damage or corrosion should be addressed during use and blocks seriously affected must be discarded immediately.) The frequency of calibration depends on the tolerance requirements of the work, the amount of use and conditions under which the gage blocks are used. The most economical cycle for any particular set of gauge blocks is best determined by studying the calibration history. The table below indicates timings for a typical initial calibration cycle for the various grades of block.

Application	Cycle (years)	Grade
Reference standard	1 - 2	K
Calibration	2	K or 0
Inspection	2	0 or 1
Shop floor	0.5 - 1	1 or 2

As an accredited calibration laboratory, Mitutoyo offers a traceable calibration service for customers' gauge blocks. Our regular calibration service features:

- Gauge blocks manufactured by any maker can be calibrated.
- Cleansing and removal of burrs.
- Central dimension and dimensional deviations of each block are measured.
- Calibration results are provided for immediate use and for building a calibration history of each block.

E

Ceraston
SERIES 516 — Accessory for Gauge Block Maintenance

Application example

- Alumina-ceramic abrasive stone for removing burrs from hard materials such as ceramics that ordinary stones cannot handle.
- Can be used both for steel gauge blocks and CERA blocks.
- Excellent in the ease of removing burrs and durability compared with Arkansas stones.
- Both sides can be used.

601644
150 (W) ×50 (D) ×20 (H) mm

601645
100 (W) ×25 (D) ×12 (H) mm

Removing burrs

Figure 1

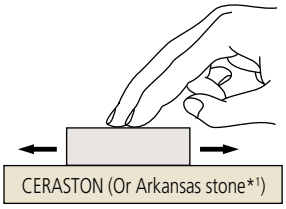
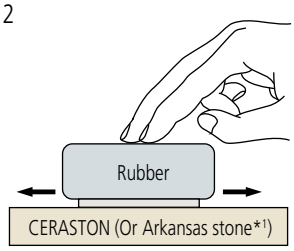


Figure 2



(1) Wipe any dust and oil films from the gauge block and the Ceraston (or Arkansas stone) using a solvent.
(2) Place the gauge block on the Ceraston so that the measuring face that has burrs is on the abrasive surface of the stone. While applying light pressure, move the gauge block to and fro about ten times (Fig. 1). Use a block rubber for thin gauge blocks to apply even pressure (Fig. 2).
(3) Check the measuring face for burrs with an optical flat. If the burrs have not been removed, repeat step (2). If burrs are too large, they may not be removed with an abrasive stone. If so, discard the gauge block.

*1 Mitutoyo does not offer Arkansas stones.

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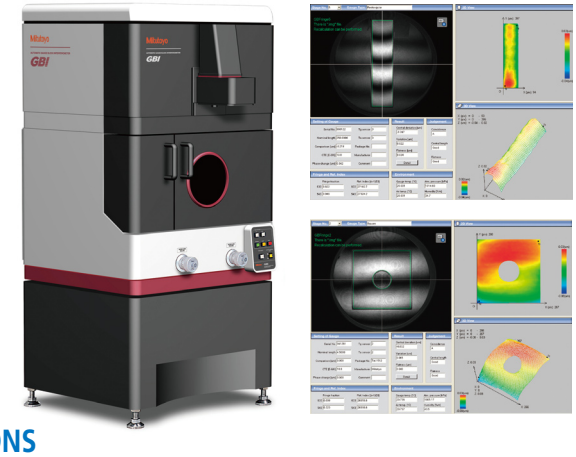
Gauge Block Calibration

Length Standards Brought to You by Mitutoyo

Automatic Gauge Block Interferometer GBI (Interference-fringe analysis principle)



An inspection certificate is supplied as standard. Refer to page E-4 for details.

- Automatic primary-level measuring instrument for gauge block lengths between 0.1 mm and 250 mm using the principle of optical interference. The GBI is a Twyman-Green interferometer which employs the method of multiple wavelength coincidence to calibrate gauge blocks by an absolute method to the highest level of accuracy.
- The GBI automatically detects the distribution of interference fringes with a CCD camera and processes the data. Measurement of parallelism and flatness is provided as well as lengths based on the phase shift method and the interference fringe analysis software.
- The intensity and wavelength of the He-Ne laser light source and Nd:YVO_4 light source are highly stable. These light sources allow highly accurate and repeatable measurement.
- Both the refractive index of air and the thermal expansion of gauge blocks are automatically compensated for by computer which is linked to a thermometer, hygrometer and barometer.

SPECIFICATIONS

Metric

Range	Measuring Uncertainty (Coverage range factor k = 2)	Number of gauge blocks that can be mounted on the measuring table	Light sources	Operating conditions
0.1 mm - 250 mm	0.025 μm+0.2x10^{-6} L L = Gauge block length (mm)	12	633 nm frequency-stabilized He-Ne laser 532 nm frequency-stabilized Nd:YVO_4 laser	20±0.5 °C Under mild temperature change without direct exposure to cold or warm air

Gauge Block Comparator GBCD-100A SERIES 565 - Automatic Comparator with Dual Gage Heads

An inspection certificate is supplied as standard. Refer to page E-4 for details.

- Measures the length of rectangular gauge blocks in the size range 0.5 mm to 100 mm. It automatically compares a test block with an appropriate reference gauge block.
- The compensation result is not affected by any warping of thinner gauge blocks due to the use of upper and lower gage heads (dual-head system).
- Measurement configuration: 1 cycle of automatic comparison measurement with a standard gauge block.

SPECIFICATIONS

Metric

Range	Resolution	Accuracy in narrow range (20 °C)	Upper gaging head		
			Type	Measuring force	Contact point
0.5 mm - 100 mm	0.01 μm	±(0.03+0.3L/1000) μm* L = Gauge block length (mm)	Mu-Checker	1 N	Carbide contact point of radius 20 mm

Lower gaging head			Operating conditions
Type	Measuring force	Contact point	
Mu-Checker	0.6 N	Carbide contact point of radius 5 mm	Temperature: 20 °C ±1 °C Humidity: 58 %RH ±15 %RH

* Uncertainty of measurement at the 95 % confidence level (not including the calibration error of the reference gauge block).

Special bridge-type block

516-145-E2

Compensation master blocks for gauge block comparators (optional accessory)

An inspection certificate is supplied as standard.
Refer to page E-4 for details.

Gauge Block Comparator GBCD-250
SERIES 565 — Manual Comparator with Dual Gage Heads

- Measures Rectangular Gauge Blocks and Square Gauge Blocks (latter requires dedicated holder - optional accessory) by manual comparison with an appropriate reference gauge block in the size range 0.1 mm to 250 mm
- Measuring method: Differential measurement between upper and lower gage heads (dual head system)

SPECIFICATIONS

Metric

Range	Resolution	Accuracy (Confidence level 95 %) Comparison measurement of the same nominal length	Accuracy (Confidence level 95 %) Dimensional deviations between standard gauge block and measurement gauge block: ±3 mm
0.1 mm - 250 mm	0.001 µm	±(0.03+0.3L/1000) µm* L = Gauge block length (mm)	±(0.06+0.3L/1000) µm* L = Gauge block length (mm)

Upper gaging head			Lower gaging head			Operating conditions
Type	Measuring force	Contact point	Type	Measuring force	Contact point	
Linear Gage	0.4 N	Carbide contact point of radius 20 mm	Linear Gage	0.2 N	Carbide contact point of radius 5 mm	Temperature: 20 °C ±1 °C Humidity: 30 %RH to 60 %RH

* Uncertainty of measurement at the 95 % confidence level (not including the calibration error of the reference gauge block).

E