MEASURING TOOLS
GAUGE BLOCKS

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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.

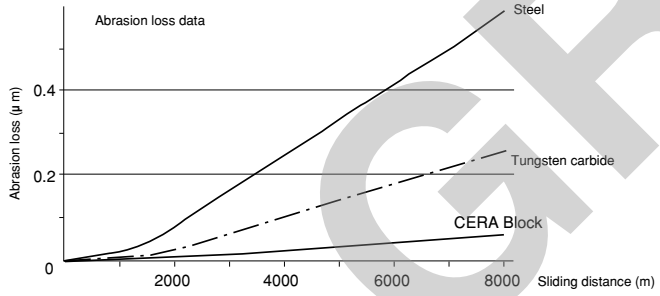
Abrasion Resistance and Dimensional Stability of Steel Blocks

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.

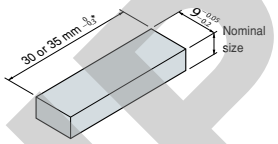


4. **Dimensionally Stable**
   CERA Blocks are free from dimensional change over time.
5. **Clearly Marked Sizes**
   Black characters, indicating the nominal length, are inscribed by laser and are clearly visible against the white surface of the block.
6. **Non-magnetic Nature Prevents Steel Swarf Contamination**
7. **High Wringing Force**
   Superior flatness and surface finish provides maximum wringing force.

Classification of Gauge Blocks by Shape

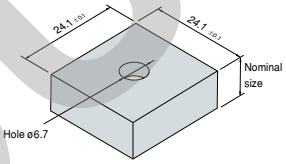
Mitutoyo broadly divides gauge blocks into two categories according to the block shape.

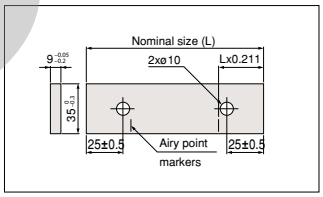
Rectangular gauge blocks



* 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-012, E-013 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	Grage
Workshop use	• Mounting tools and cutters	2
	• Manufacturing gage • 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 = 45.6785mm

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

1.0005
1.008
1.17
17.5
+) 25
45.6785mm

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

2.0005
2.008
2.17
14.5
+) 25
45.6785mm

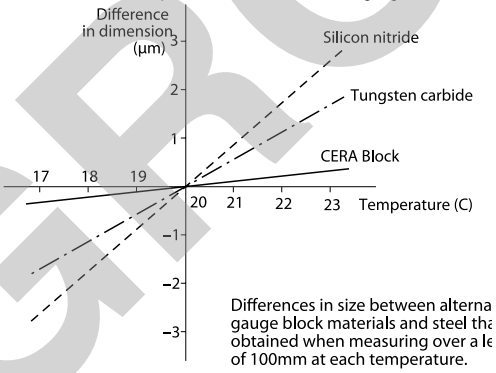
8. Superior Material Characteristics of CERA Block

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±0.2
Flexural strength by 3-point bending (MPa)	1270	1960	1960	210
Fracture toughness K1c (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	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 alterna
gauge block materials and steel tha
obtained when measuring over a le
of 100mm 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 24.1mm 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.

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	±0.20μm	0.05μm	±0.12μm	0.10μm
over 10	up to 25	±0.30μm	0.05μm	±0.14μm	0.10μm
over 25	up to 50	±0.40μm	0.06μm	±0.20μm	0.10μm
over 50	up to 75	±0.50μm	0.06μm	±0.25μm	0.12μm
over 75	up to 100	±0.60μm	0.07μm	±0.30μm	0.12μm
over 100	up to 150	±0.80μm	0.08μm	±0.40μm	0.14μm
over 150	up to 200	±1.00μm	0.09μm	±0.50μm	0.16μm
over 200	up to 250	±1.20μm	0.10μm	±0.60μm	0.16μm
over 250	up to 300	±1.40μm	0.10μm	±0.70μm	0.18μm
over 300	up to 400	±1.80μm	0.12μm	±0.90μm	0.20μm
over 400	up to 500	±2.20μm	0.14μm	±1.10μm	0.25μm
over 500	up to 600	±2.60μm	0.16μm	±1.30μm	0.25μm
over 600	up to 700	±3.00μm	0.18μm	±1.50μm	0.30μm
over 700	up to 800	±3.40μm	0.20μm	±1.70μm	0.30μm
over 800	up to 900	±3.80μm	0.20μm	±1.90μm	0.35μm
over 900	up to 1000	±4.20μm	0.25μm	±2.00μm	0.40μm

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	±0.20μm	0.16μm	±0.45μm	0.30μm
over 10	up to 25	±0.30μm	0.16μm	±0.60μm	0.30μm
over 25	up to 50	±0.40μm	0.18μm	±0.80μm	0.30μm
over 50	up to 75	±0.50μm	0.18μm	±1.00μm	0.35μm
over 75	up to 100	±0.60μm	0.20μm	±1.20μm	0.35μm
over 100	up to 150	±0.80μm	0.20μm	±1.60μm	0.40μm
over 150	up to 200	±1.00μm	0.25μm	±2.00μm	0.40μm
over 200	up to 250	±1.20μm	0.25μm	±2.40μm	0.45μm
over 250	up to 300	±1.40μm	0.25μm	±2.80μm	0.50μm
over 300	up to 400	±1.80μm	0.30μm	±3.60μm	0.50μm
over 400	up to 500	±2.20μm	0.35μm	±4.40μm	0.60μm
over 500	up to 600	±2.60μm	0.40μm	±5.00μm	0.70μm
over 600	up to 700	±3.00μm	0.45μm	±6.00μm	0.70μm
over 700	up to 800	±3.40μm	0.50μm	±6.50μm	0.80μm
over 800	up to 900	±3.80μm	0.50μm	±7.50μm	0.90μm
over 900	up to 1000	±4.20μm	0.60μm	±8.00μm	1.00μm

ACCURACY SPECIFICATIONS: BS 4311: 2007

(at 20°C)

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	±8μin	2μin	±5μin	4μin
Over 0.4	up to 1	±12μin	2μin	±6μin	4μin
Over 1	up to 2	±16μin	3μin	±8μin	4μin
Over 2	up to 3	±20μin	3μin	±10μin	5μin
Over 3	up to 4	±24μin	3μin	±12μin	5μin

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	±8μin	6μin	±18μin	12μin
Over 0.4	up to 1	±12μin	6μin	±24μin	12μin
Over 1	up to 2	±16μin	7μin	±32μin	12μin
Over 2	up to 3	±20μin	7μin	±40μin	14μin
Over 3	up to 4	±24μin	8μin	±28μin	14μin

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

(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 .05	±12μin	2μin	±4μin	2μin	±6μin	4μin	±12μin	6μin	±24μin	12μin
over .05	up to .4	±10μin	2μin	±3μin	2μin	±5μin	4μin	±8μin	6μin	±18μin	12μin
over .45	up to 1	±12μin	2μin	±3μin	2μin	±6μin	4μin	±12μin	6μin	±24μin	12μin
over 1	up to 2	±16μin	2μin	±4μin	2μin	±8μin	4μin	±16μin	6μin	±32μin	12μin
over 2	up to 3	±20μin	2μin	±5μin	3μin	±10μin	4μin	±20μin	6μin	±40μin	14μin
over 3	up to 4	±24μin	3μin	±6μin	3μin	±12μin	5μin	±24μin	8μin	±48μin	14μin
over 4	up to 5	±32μin	3μin	±8μin	3μin	±16μin	5μin	±32μin	8μin	±64μin	16μin
over 5	up to 6	±32μin	3μin	±8μin	3μin	±16μin	5μin	±32μin	8μin	±64μin	16μin
over 6	up to 7	±40μin	4μin	±10μin	4μin	±20μin	6μin	±40μin	10μin	±80μin	16μin
over 7	up to 8	±40μin	4μin	±10μin	4μin	±20μin	6μin	±40μin	10μin	±80μin	16μin
over 8	up to 10	±48μin	4μin	±12μin	4μin	±24μin	6μin	±48μin	10μin	±104μin	18μin
over 10	up to 12	±56μin	4μin	±14μin	4μin	±28μin	7μin	±56μin	10μin	±112μin	20μin
over 12	up to 16	±72μin	5μin	±18μin	5μin	±36μin	8μin	±72μin	12μin	±144μin	20μin
over 16	up to 20	±88μin	6μin	±20μin	6μin	±44μin	10μin	±88μin	14μin	±176μin	24μin
over 20	up to 24	±104μin	6μin	±25μin	6μin	±52μin	10μin	±104μin	16μin	±200μin	28μin
over 24	up to 28	±120μin	7μin	±30μin	7μin	±60μin	12μin	±120μin	18μin	±240μin	28μin
over 28	up to 32	±136μin	8μin	±34μin	8μin	±68μin	12μin	±136μin	20μin	±260μin	32μin
over 32	up to 36	±152μin	8μin	±38μin	8μin	±76μin	14μin	±152μin	20μin	±300μin	36μin
over 36	up to 40	±160μin	10μin	±40μin	10μin	±80μin	16μin	±168μin	24μin	±320μin	40μin

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	±0.30μm	0.05μm	±0.10μm	0.05μm	±0.14μm	0.10μm	±0.30μm	0.16μm	±0.60μm	0.30μm
over 0.5	up to 10	±0.20μm	0.05μm	±0.07μm	0.05μm	±0.12μm	0.10μm	±0.20μm	0.16μm	±0.45μm	0.30μm
over 10	up to 25	±0.30μm	0.05μm	±0.07μm	0.05μm	±0.14μm	0.10μm	±0.30μm	0.16μm	±0.60μm	0.30μm
over 25	up to 50	±0.40μm	0.06μm	±0.10μm	0.06μm	±0.20μm	0.10μm	±0.40μm	0.18μm	±0.80μm	0.30μm
over 50	up to 75	±0.50μm	0.06μm	±0.12μm	0.06μm	±0.25μm	0.12μm	±0.50μm	0.18μm	±1.00μm	0.35μm
over 75	up to 100	±0.60μm	0.07μm	±0.15μm	0.07μm	±0.30μm	0.12μm	±0.60μm	0.20μm	±1.20μm	0.35μm
over 100	up to 150	±0.80μm	0.08μm	±0.20μm	0.08μm	±0.40μm	0.14μm	±0.80μm	0.20μm	±1.60μm	0.40μm
over 150	up to 200	±1.00μm	0.09μm	±0.25μm	0.09μm	±0.50μm	0.16μm	±1.00μm	0.25μm	±2.00μm	0.40μm
over 200	up to 250	±1.20μm	0.10μm	±0.30μm	0.10μm	±0.60μm	0.16μm	±1.20μm	0.25μm	±2.40μm	0.45μm
over 250	up to 300	±1.40μm	0.10μm	±0.35μm	0.10μm	±0.70μm	0.18μm	±1.40μm	0.25μm	±2.80μm	0.50μm
over 300	up to 400	±1.80μm	0.12μm	±0.45μm	0.12μm	±0.90μm	0.20μm	±1.80μm	0.30μm	±3.60μm	0.50μm
over 400	up to 500	±2.20μm	0.14μm	±0.50μm	0.14μm	±1.10μm	0.25μm	±2.20μm	0.35μm	±4.40μm	0.60μm
over 500	up to 600	±2.60μm	0.16μm	±0.65μm	0.16μm	±1.30μm	0.25μm	±2.60μm	0.40μm	±5.00μm	0.70μm
over 600	up to 700	±3.00μm	0.18μm	±0.75μm	0.18μm	±1.50μm	0.30μm	±3.00μm	0.45μm	±6.00μm	0.70μm
over 700	up to 800	±3.40μm	0.20μm	±0.85μm	0.20μm	±1.70μm	0.30μm	±3.40μm	0.50μm	±6.50μm	0.80μm
over 800	up to 900	±3.80μm	0.20μm	±0.95μm	0.20μm	±1.90μm	0.35μm	±3.80μm	0.50μm	±7.50μm	0.90μm
over 900	up to 1000	±4.20μm	0.25μm	±1.00μm	0.25μm	±2.00μm	0.40μm	±4.20μm	0.60μm	±8.00μm	1.00μm

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Gauge Blocks with a Calibrated Coefficient of Thermal Expansion

Mitutoyo guarantees the product quality. PROPRIETARY INSPECTION CERTIFICATE Mitutoyo guarantees the product quality.

*** 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 100mm type

FEATURE

- 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 500mm.

Metric Block 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

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

* 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.

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ZERO CERA Blocks

Mitutoyo guarantees the product quality. PROPRIETARY INSPECTION CERTIFICATE Mitutoyo guarantees the product quality.

FEATURE

- Thermal expansion in the temperature range 20±1ºC less than 1/500 that of steel (0±0.02x10^{-6}/K(20ºC))
- 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)

Metric Block

Order No.			Length (mm)
JIS/ISO/DIN	BS	ASME	
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

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Metric/Inch Rectangular Gauge Block Sets
SERIES 516

FEATURE

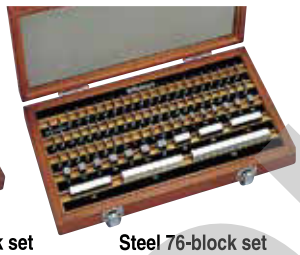
• Mitutoyo provides a wide selection of boxed sets of gauge blocks to meet the various needs of industry. Selecting the best set, or sets, to acquire usually depends on the accuracy required by the target applications, the level of convenience desired (larger sets offer more combination possibilities)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

PROPRIETARY INSPECTION CERTIFICATE

Steel 1mm 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

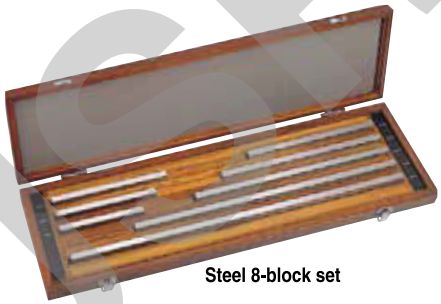
Steel 0.001mm Step Block Sets


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

CERA 1mm 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 0.001mm Step Block Sets

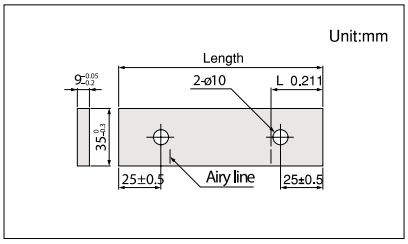

CERA 9-block set


CERA 9-block set


CERA 18-block set

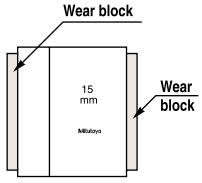
CERA Long Block Sets


CERA 8-block set



CERA Wear Block Sets


CERA 2-block set



1mm 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-002 and the accuracy standards to which they are manufactured are given on page E-004.

PROPRIETARY INSPECTION CERTIFICATE
Mitutoyo guarantees the product quality.

*** 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

0.001mm Step Block Set

* Details of the overall sizes for forms of block are given on page E-002 and the accuracy standards to which they are manufactured are given on page E-004.

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		
	Steel	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	—			

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		
	Steel	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	—			

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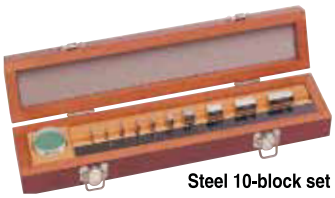
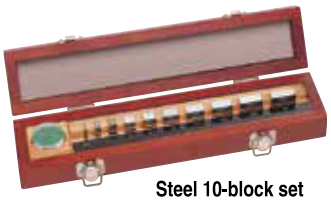
Micrometer Inspection Gauge Block Sets
SERIES 516

FEATURE

• 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").
Sets **516-115/6/7, 516-165/6** and **516-177** contain blocks in 25 mm (or 1") 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 2mm/rev spindle feed.

Steel


Steel 10-block set

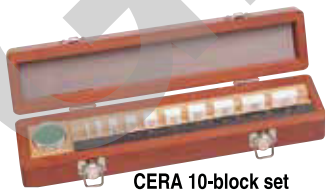

Steel 10-block set


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)

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

*** 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

Metric Block Sets

Blocks per set	Order No.		Standard/ grade available and Suffix No.*			Blocks included in set
	Steel	CERA	ISO/DIN/ JIS	ASME	BS	
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, 50mm, Cerastone, Optical parallels (t = 12mm, 25mm)
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, 25mm, Optical parallel (t = 12mm)
10	**516-103** **516-101** —	**516-152** **516-153** **516-154**	0: -■ 0 1: -■ 0 2: -■ 0	0: -■ 0 1: -■ 0 —	— — —	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25mm
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, 25mm
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, 25mm, Optical parallel (t = 12mm)
10	**516-132** **156-133** **156-134**	**516-182** **516-183** **516-184**	0: -■ 0 1: -■ 0 2: -■ 0	— — —	— — —	1.25, 1.50, 1, 2, 3, 5, 10, 15, 20, 25mm, Micro Checker, Optical parallel (t = 12mm)
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, 25mm, Micro Checker, Optical parallel (t = 12mm)
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, 200mm

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SERIES 516 – Caliper Inspection Gauge Block Sets

Metric Block Sets

Blocks per set	Order No.		Standard/ grade available and Suffix No.*			Blocks included in set
	Steel	CERA	ISO/DIN/ JIS	ASME	BS	
5	— —	— **516-174**	— 2: -10	— —	— —	5 pcs.: 10.3, 24.5, 50, 75, 100mm, Ceramic plain jaws, Holder (250mm), Glove
4	**516-526** **516-527**	**516-566** **516-567**	1: -10 2: -10	— —	— —	4 pcs.: 10, 30, 50, 125mm, Setting ring (ø4mm, ø10mm), Pin gage (ø10mm), Glove
3	**516-124** **516-125**	**516-150** **516-151**	1: -10 2: -10	— —	— —	3 pcs.: 30, 41.3, 131.4mm, Setting ring (ø4mm, ø25mm), Glove
2	**516-122** **516-123**	**516-172** **516-173**	1: -10 2: -10	— —	— —	2 pcs.: 41.3, 131.4mm, Setting ring (ø20mm), Glove

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Individual Metric Rectangular Gauge Blocks

FEATURE

- If using only one length repeatedly, it is a good idea 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.

PROPRIETARY INSPECTION CERTIFICATE

*** 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

Inspection Certificate

Metric Blocks

* Details of the overall sizes for forms of block are given on page E-002 and the accuracy standards to which they are manufactured are given on page E-004.

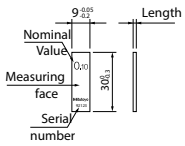
Length (mm)	Order No.*	
	Steel	CERA
0.1	**611821**	—
0.11	**611860**	—
0.12	**611861**	—
0.13	**611862**	—
0.14	**611863**	—
0.15	**611822**	—
0.16	**611864**	—
0.17	**611865**	—
0.18	**611866**	—
0.19	**611867**	—
0.2	**611823**	—
0.21	**611868**	—
0.22	**611869**	—
0.23	**611870**	—
0.24	**611871**	—
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**	—

Length (mm)	Order No.*	
	Steel	CERA
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**

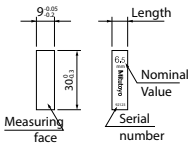
Length (mm)	Order No.*	
	Steel	CERA
1.002	**611522**	**613522**
1.003	**611523**	**613523**
1.004	**611524**	**613524**
1.005	**611525**	**613525**
1.006	**611526**	**613526**
1.007	**611527**	**613527**
1.008	**611528**	**613528**
1.009	**611529**	**613529**
1.01	**611561**	**613561**
1.02	**611562**	**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**
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**

Unit: mm

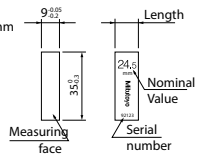
Nominal length:
0.1mm - 5.5mm
(.004" - .25")



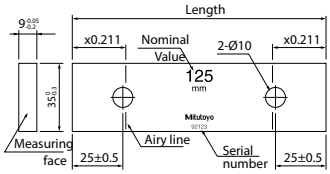
Nominal length:
6mm - 10mm
(.3" - .4")



Nominal length:
10.3mm - 100mm
(.45" - 4")



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



Length (mm)	Order No.* Steel	Order No.* CERA
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	—
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	—

Length (mm)	Order No.* Steel	Order No.* CERA
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
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

Length (mm)	Order No.* Steel	Order No.* CERA
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

เกจบล็อค
Rectangular Gauge Blocks Accessories
SERIES 516

FEATURE

• 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 gauge blocks, you can easily and quickly build up a precision gage.

516-601 (22 pcs)

516-602 (14 pcs)

Item Description	Item Order No.	Set		Qty.
		22 pcs. **516-601**	14 pcs. **516-602**	
Holder	**619002**	-	O	1 pc.
	619003	O	O	
	619004	O	O	
	619005	O	O	
Base	**619009**	O	O	
Half round jaw	**619010**	O	O	One pair (2pcs.)
	619011	O	O	
	619012	O	O	
	619013	O	-	
	619014	O	-	
Plain jaw	**619018**	O	-	
Scriber point	**619019**	O	O	1 pc.
Center point	**619020**	O	O	
Tram point	**619021**	O	-	One pair (2pcs.)
Triangular straight edge	**619022**	O	O	1pc.
	619023	O	-	

* Only 1 pc is supplied for each Order No. However, half round jaw, plain jaw, and tram point are supplied in a pair. (2 pcs).

Order	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

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

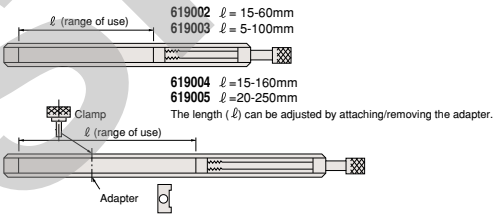
Marking a workpiece using the base, a holder and the scriber point

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

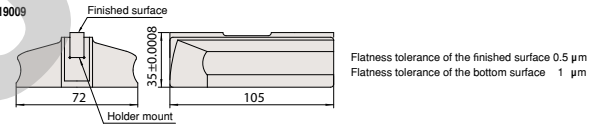
DIAMETER

Holder

Thickness = 15mm
Width = 29.5mm



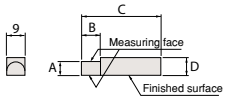
Base 619009



Flatness tolerance of the finished surface 0.5 µm
Flatness tolerance of the bottom surface 1 µm

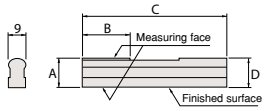
Half round jaw

Type I

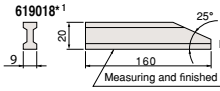


Flatness tolerance of the finished surface 0.5 µm

Type II

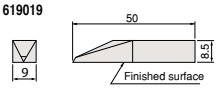


Plain jaw (B type) 619018*1



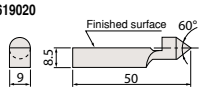
Flatness tolerance of the finished surface 1µm

Scriber point 619019



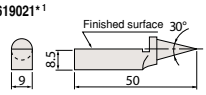
Flatness tolerance of the finished surface 0.5 µm

Center point 619020



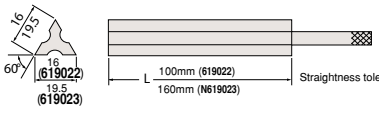
Eccentricity tolerance of the point ±10µm
Flatness tolerance of the finished surface 0.5µm

Tram point 619021*1



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

Triangular straight edge



Straightness tolerance of the edge 1.2 µm

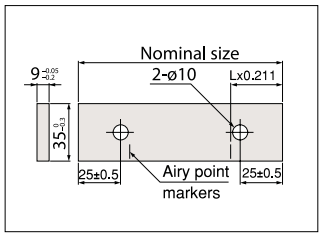
*1 Qty: One pair (2 pcs)

เกจบล็อค

Accessories for Rectangular Gauge Blocks over 100mm SERIES 516

FEATURE

- 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.



Coupling holes in long gauge blocks

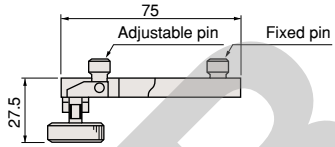
Use of B-type connectors in gage construction

516-605 (14 pcs)

Set Order No.	Individual Item Oeder 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.

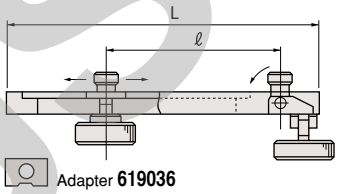
* Only 1 pc is supplied for each Order No. However, half round jaw, plain jaw, and tram point are supplied in a pair. (2 pcs).

Connector A 619031



Used for directly coupling two long gauge blocks.

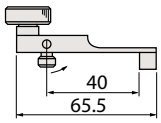
Connectors B and C



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

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.

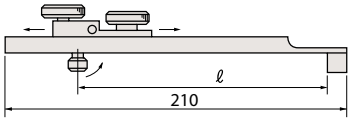
Connector D 619034



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

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

Connector E 619035

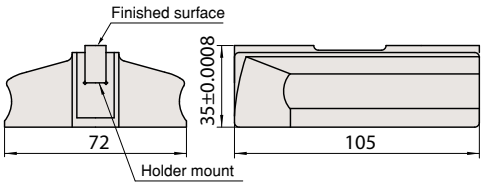


ℓ =70 - 175mm

Adapter **619036** (1pc.)

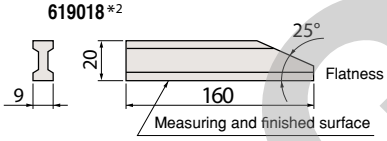
Used for attaching a long gauge block to the base over a stack of regular gauge blocks wrung between the base and long gauge block. The length ℓ is highly adjustable to accommodate the variable length of the stack.

Base 619009



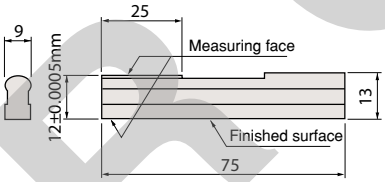
Flatness tolerance of the finished surface 0.5 µm
Flatness tolerance of the bottom surface 1 µm

Plain jaw 619018*2



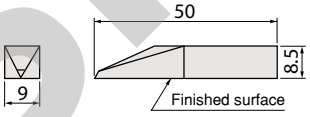
Flatness tolerance of the finished surface 1 µm

Half round jaw 619013*2



Flatness tolerance of the finished surface 0.5 µm

Scriber point 619019



Flatness tolerance of the finished surface 0.5 µm

Assortment of accessories for 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.

1Item		Order No.	300mm		400mm		500mm		600mm		700mm		800mm		900mm		1000mm	
			Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer
Rectangular	**200mm**	**611682**							1	1								
gauge block	**300mm**	**611683**	1	1							1	1	1	1				
(norminal	**400mm**	**611684**			1	1			1	1	1	1			1	1		
dimension)	**500mm**	**611685**					1	1					1	1	1	1	2	2
Connector A		**619031**							1	1	1	1	1	1	1	1	1	1
Connector B*1		**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)

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

FEATURE

- Square gauge block sets have several unique characteristics (refer to page E-003 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 tungstencarbide wear blocks on the ends of a stack. There are two available, of nominal dimension 1mm and 2mm. 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.

Metric Block Sets

Blocks per set	Order No.		Standard/ grade available and Suffix No.*		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	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.		Standard/ grade available and Suffix No.*		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	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.		Standard/ grade available and Suffix No.*		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	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	—			

PROPRIETARY INSPECTION CERTIFICATE
Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

*** 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

เกจบล็อค
Square Gauge Block Accessories Set

FEATURE

- 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.

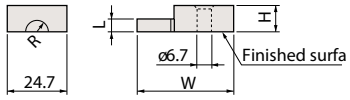
516-611

Metric

Order No. **516-611**	Included in set	Quantity Supplied
619070	Half round jaw	2 pcs.
619071	Half round jaw	
619072	Plain jaw	1 pc.
619073	Center point	
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	

* 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.

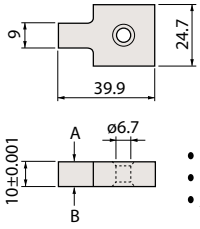
Half round jaw



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

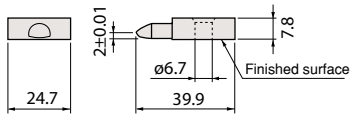
- Flatness tolerance 0.5µm
- Parallelism tolerance of L 0.5µm
- Tolerance of L ±0.5µm

Plain jaw 619072



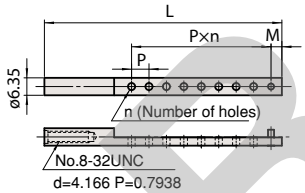
- Flatness tolerance 0.12µm
- Parallelism tolerance 0.12µm
- A and B are finished surfaces

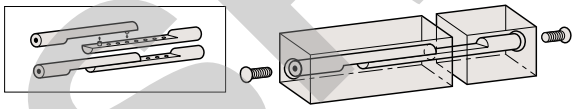
Center point 619073



- Flatness tolerance 0.5µm

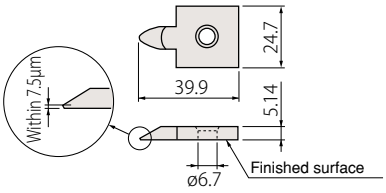
Adjustable tie rod





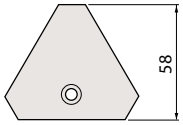
Order No.	L	M	P	n
619060	124.5mm	3.85mm	6.35mm	14
619061	86.5mm	3.95mm	6.35mm	8

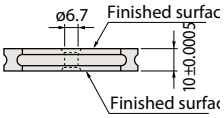
Scriber point 619054



- Flatness of datum surface 0.5 µm

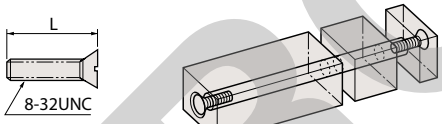
Base 619074





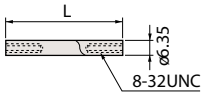
- Parallelism tolerance 1.5µm
- Flatness tolerance 1.5µm
  (The surface within 1.5mm of edge is excluded)

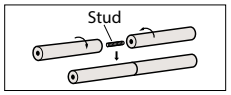
Flat head screw

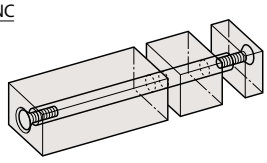


Order No.	L
619057	31.6mm
619058	15.8mm

Tie rod

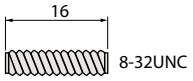




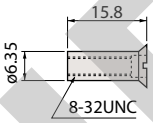


Order No.	L
619065	19mm
619064	38mm
619063	57mm
619062	76mm

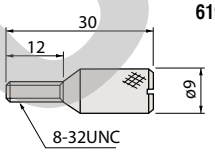
Stud 619056



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 600mN/m. The chart below shows the approximate length contraction of a 100mm gauge stack using typical torque values.

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

Accessories used for combining square gauge blocks

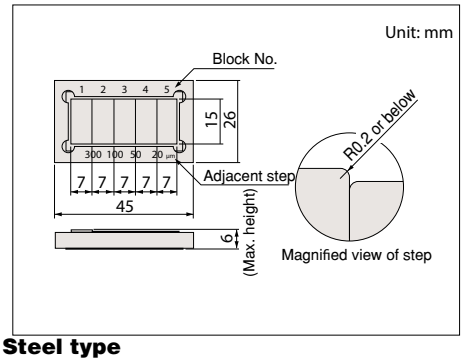
Overall length (mm)		Min.	21	36	34	41	45	58	64	72	77	82	91	95	109	117	130	148	121	167	143	160	205	180	223	240	258	295	375
Order No.	Included inset	Max.	30	43	43	50	60	72	79	88	91	97	107	109	125	135	150	169	180	184	210	255	270	285	288	345	363	445	520
619059	Slotted head nut		1	1		1																			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

เกจบล็อค
Step Master
SERIES 516

FEATURE

- 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 0.01µm by using an interferometer with an accuracy tolerance of ±0.20µm.
- Steel and ceramic types are available to suit the application.
- Height differences are measured between the centers of adjacent steps.

DIAMETER



Steel type
516-199

Ceramic type
516-499

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

เกจบล็อค
Custom-made Blocks & Gages

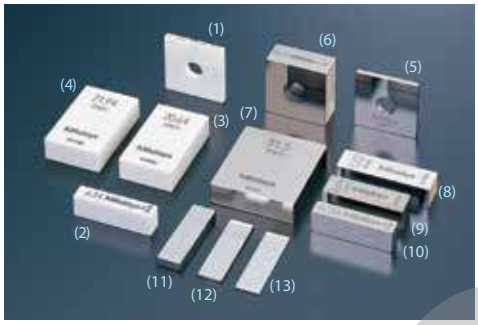
FEATURE

- 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
  - 0.1mm to 1000mm (steel)
  - 0.5mm to 500mm (ceramic)
- Nominal size increment
  - 0.0005mm (up to 100mm)
  - 0.001mm (over 100mm)
- Cross section (same as the standard product)
  - Nominal length of 10mm or less: 30 x 9mm
  - Nominal length of more than 10mm: 35 x 9mm
  - 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.)

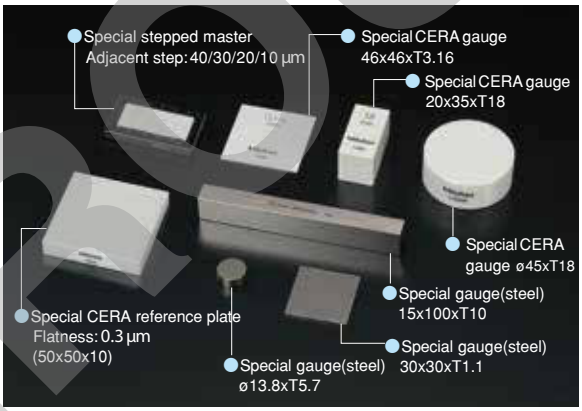
Typical examples of custom-made gauge blocks and reference gages.
Please enquire for price and delivery times for your particular requirements.



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

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

Special gauge (T: nominal), Special stepped master



เกจบล็อค
Individual Metric Square Gauge Blocks

FEATURE

- 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.

*** 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

Metric Blocks

* Details of the overall sizes for forms of block are given on page E-002, and the accuracy standards to which they are manufactured are given on page E-004.

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**	—

Length (mm)	Order No.* Steel	CERA
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	**614625**	—
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**	—

Length (mm)	Order No.* Steel	CERA
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**

เกจบล็อค
Ceraston
SERIES 516 — Accessory for Gauge Block Maintenance

601644
150 (W) x50 (D) x20 (H) mm

601645
100 (W) x25 (D) x12 (H) mm

FEATURE

- 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.

(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.

Removing burrs

Figure 1

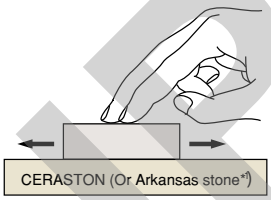
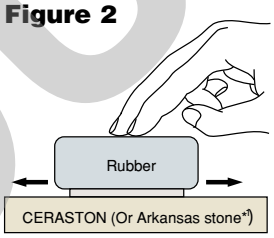
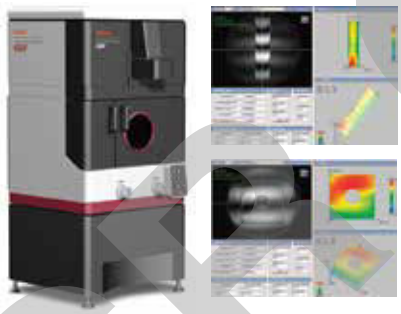


Figure 2



เกจบล็อค
Automatic Gauge Block Interferometer GBI (Interference fringe analyzing processing)



- 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:YVO4 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.

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
0.1mm - 250mm	0.025μm+0.2x10^{-6} L L = Gauge block length (mm)	12	633nm frequencystabilized He-Ne laser 532nm frequencystabilized Nd:YVO4 laser	20±0.5°C Under mild temperature change without direct exposure to cold or warm air

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

- 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.

516-145-E2

Special bridge-type block

Metric

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

Lower gaging head			Operating condition
Type	Measuring force	Contact point	
Mu-Checker	0.6N	Carbide contact point of radius of 5mm	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).

เกจบล็อค
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)

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: ±3mm
0.1mm - 250mm	0.001µm	±(0.03+0.3L/1000)µm* L = Gauge block length (mm)	±(0.05+0.3L/1000)µm* L = Gauge block length (mm)

Upper gage head			Lower gaging head			Operating condition
Type	Measuring force	Contact point	Type	Measuring force	Contact point	
Linear Gage	0.4N	Carbide contact point of radius 20mm	Linear Gage	0.2N	Carbide contact point of radius 5mm	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).

GAUGE BLOCKS
เกจบล็อค

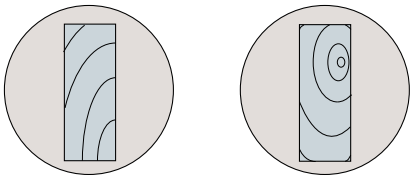
Definition of the Meter
The 17th General Conference of Weights and Measures in 1983 decided on a new definition of the meter unit as the length of the path traveled by light in a vacuum during a time interval of 1/299 792 458 of a second. The gauge block is the practical realization of this unit and as such is used widely throughout industry.

Selection, Preparation and Assembly of a Gauge Block Stack
Select gauge blocks to be combined to make up the size required for the stack.

(1) Take the following things into account when selecting gauge blocks.
- a. Use the minimum number of blocks whenever possible.
- b. Select thick gauge blocks whenever possible.
- c. Select the size from the one that has the least significant digit required, and then work back through the more significant digits.

(2) Clean the gauge blocks with an appropriate cleaning agent.

(3) Check the measuring faces for burrs by using an optical flat as follows:



a. Wipe each measuring face clean.
b. Gently place the optical flat on the gauge block measuring face.
c. Lightly slide the optical flat until interference fringes appear.
Judgment 1: If no interference fringes appear, it is assumed that there is a large burr or contaminant on the measuring face.
d.Lightly press the optical flat to check that the interference fringesdisappear.
Judgment 2: If the interference fringes disappear, no burr exists on the measuring face.
Judgment 3: If some interference fringes remain locally while the flat is gently moved to and fro, a burr exists on the measuring face. If the fringes move along with the optical flat, there is a burr on the optical flat.
e.Remove burrs, if any, from the measuring face using a flat, finegrained abrasive stone. Refer to the figures below for procedures.

Figure 1

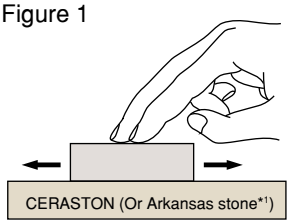
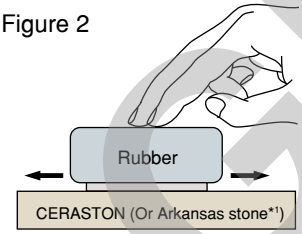


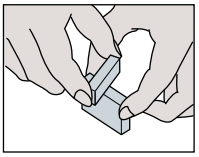
Figure 2



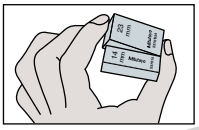
(1) Wipe any dust and oil films from the gauge block and the Ceraston (or Arkansas stone) using a solvent.
(2) Place the gauge block on the Ceraston so that the measuring face that has burrs is on the abrasive surface of the stone. While applying light pressure, move the gauge block to and fro about 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.
(4) Apply a very small amount of oil to the measuring face and spread it evenly across the face. (Wipe the face until the oil film is almost removed.) Grease, spindle oil, vaseline, etc., are commonly used.

(5) Gently overlay the faces of the gauge blocks to be wrung together. There are three methods to use (a, b and c as shown below) according to the size of blocks being wrung:

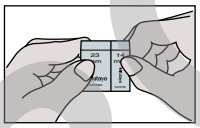
a. Wringing thick gauge blocks



Cross the gauge blocks at 90° in the middle of the measuring faces.

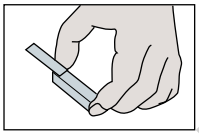


Rotate the gauge blocks while applying slight force to them. You will get a sense of wringing by sliding the blocks.

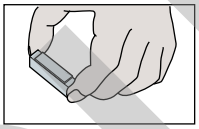


Align the measuring faces with each other.

b.Wringing a thick gauge block to a thin gauge block

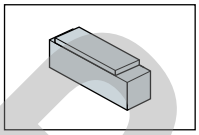


Overlap one side of a thin gauge block on one side of a thick gauge block.

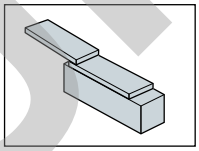


Slide the thin gauge block while pressing the entire overlapped area to align the measuring faces with each other.

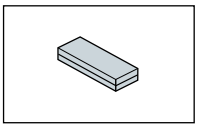
c.Wringing thin gauge blocks



To prevent thin gauge blocks from bending, first wring a thin gauge block onto a thick gauge block

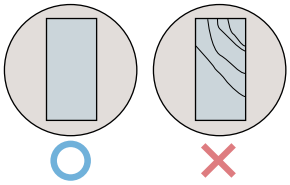


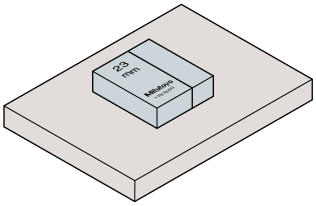
Then, wring the other thin gauge block onto the first thin gauge block.



Finally, remove the thick gauge block from the stack.

Apply an optical flat to the surface of one thin gauge block to check the wringing state.





Wipe the exposed measuring face(s) and continue building up the stack, in the same manner as above, until complete.

Thermal Stabilization Time
The following figure shows the degree of dimensional change when handling a 100mm steel gauge block with bare hands.