

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 (1mm and 2mm 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

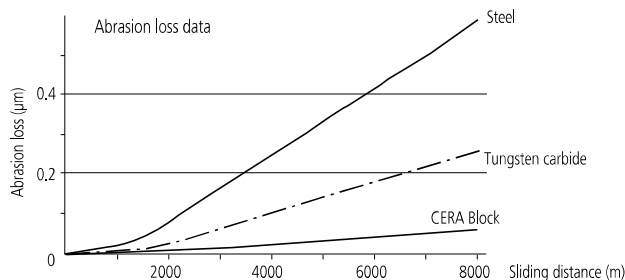
Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.

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

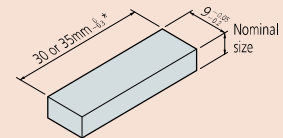
Superior flatness and surface finish provides maximum wringing force.



Classification of Gauge Blocks by Shape

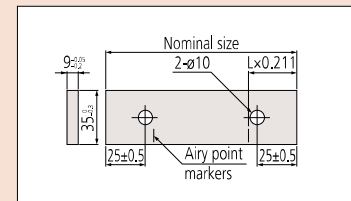
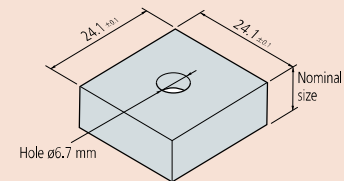
Mitutoyo broadly divides gauge blocks into two categories according to the block shape.

Rectangular gauge blocks



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

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, add a long block set.
- Select gauge blocks in accordance with the minimum length step required. Add wear block sets if necessary.
- If a set containing a large number of gauge blocks is selected, the number of combination gauge blocks required for a length is reduced and the number of combinations is increased. The accuracy will be retained and damage will be reduced.
- The specific gauge block set for micrometer inspection and caliper inspection is 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 E24 for details).
- The 2mm-based gauge blocks, which take the base of the minimum length step as 2mm, are easy to handle and will not warp, as compared to the 1mm-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, B54311, and JIS B 7506).

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

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.)

$$\begin{array}{r}
 1.0005 \\
 1.008 \\
 1.17 \\
 17.5 \\
 +) \quad 25 \\
 \hline
 45.6785\text{mm}
 \end{array}$$

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

$$\begin{array}{r}
 2.0005 \\
 2.008 \\
 2.17 \\
 14.5 \\
 +) \quad 25 \\
 \hline
 45.6785\text{mm}
 \end{array}$$

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



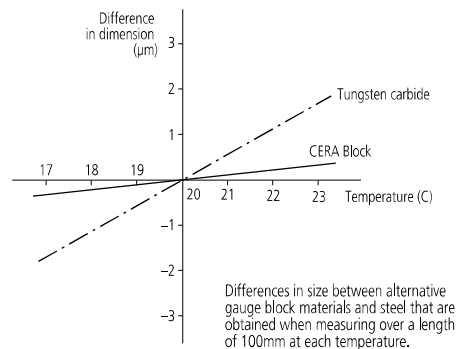
8. Superior Material Characteristics of CERA Block

| Property | Material | CERA Block (ZrO ₂) | Steel (Fe) | Tungsten Carbide (WC-Co) |
|--|----------|--------------------------------|------------|--------------------------|
| Hardness (HV) | | 1350 | 800 | 1650 |
| Coefficient of thermal expansion (10 ⁻⁶ /K) | | 9.3±0.5 | 10.8±0.5 | 5.5±1.0 |
| Flexural strength by 3-point bending (MPa) | | 1270 | 1960 | 1960 |
| Fracture toughness K _{1c} (MPa•m ^{1/2}) | | 7 | 120 | 12 |
| Young's modulus x10 ⁴ (MPa) | | 20.6 | 20.6 | 61.8 |
| Poisson's ratio | | 0.3 | 0.3 | 0.2 |
| Specific gravity (Kg/dm ³) | | 6.0 | 7.8 | 14.8 |
| Thermal conductivity (W/m•k) | | 2.9 | 54.4 | 79.5 |

* 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 in the environment of severe 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.



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.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

ACCURACY SPECIFICATIONS: JIS B 7506-2004 (JAPAN)

(at 20°C)

| 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 |

| 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: Part 1: 1993 (UK)

(at 20°C)

| Nominal length (inch) | | Grade K | | | Grade 0 | | |
|-----------------------|-----------|---|-------------|----------|---|-------------|----------|
| | | Tolerance on deviation of measured central length | Parallelism | Flatness | Tolerance on deviation of measured central length | Parallelism | Flatness |
| over 0 | up to 0.4 | ±5µin | 2µin | 2µin | ±5µin | 4µin | 4µin |
| over 0.4 | up to 1 | ±6µin | 2µin | 2µin | ±6µin | 4µin | 4µin |
| over 1 | up to 2 | ±8µin | 3µin | 2µin | ±8µin | 4µin | 4µin |
| over 2 | up to 3 | ±10µin | 3µin | 2µin | ±10µin | 5µin | 4µin |
| over 3 | up to 4 | ±12µin | 3µin | 2µin | ±12µin | 5µin | 4µin |

| Nominal length (inch) | | Grade 1 | | | Grade 2 | | |
|-----------------------|-----------|---|-------------|----------|---|-------------|----------|
| | | Tolerance on deviation of measured central length | Parallelism | Flatness | Tolerance on deviation of measured central length | Parallelism | Flatness |
| over 0 | up to 0.4 | ±10µin | 6µin | 6µin | ±20µin | 12µin | 10µin |
| over 0.4 | up to 1 | ±12µin | 6µin | 6µin | ±25µin | 12µin | 10µin |
| over 1 | up to 2 | ±15µin | 7µin | 6µin | ±30µin | 12µin | 10µin |
| over 2 | up to 3 | ±20µin | 7µin | 6µin | ±40µin | 14µin | 10µin |
| over 3 | up to 4 | ±25µin | 8µin | 6µin | ±50µin | 14µin | 10µin |

ACCURACY SPECIFICATIONS: BS 4311: Part 1: 1993 (UK)

(at 20°C)

| Nominal length (mm) | | Grade K | | | Grade 0 | | |
|---------------------|-----------|---|-------------|----------|---|-------------|----------|
| | | Tolerance on deviation of measured central length | Parallelism | Flatness | Tolerance on deviation of measured central length | Parallelism | Flatness |
| over 0 | up to 10 | ±0.12µm | 0.05µm | 0.05µm | ±0.12µm | 0.10µm | 0.10µm |
| over 10 | up to 25 | ±0.15µm | 0.05µm | 0.05µm | ±0.15µm | 0.10µm | 0.10µm |
| over 25 | up to 50 | ±0.20µm | 0.06µm | 0.05µm | ±0.20µm | 0.10µm | 0.10µm |
| over 50 | up to 75 | ±0.25µm | 0.06µm | 0.05µm | ±0.25µm | 0.12µm | 0.10µm |
| over 75 | up to 100 | ±0.30µm | 0.07µm | 0.05µm | ±0.30µm | 0.12µm | 0.10µm |

| Nominal length (mm) | | Grade 1 | | | Grade 2 | | |
|---------------------|-----------|---|-------------|----------|---|-------------|----------|
| | | Tolerance on deviation of measured central length | Parallelism | Flatness | Tolerance on deviation of measured central length | Parallelism | Flatness |
| over 0 | up to 10 | ±0.25µm | 0.16µm | 0.15µm | ±0.50µm | 0.30µm | 0.25µm |
| over 10 | up to 25 | ±0.30µm | 0.16µm | 0.15µm | ±0.60µm | 0.30µm | 0.25µm |
| over 25 | up to 50 | ±0.40µm | 0.18µm | 0.15µm | ±0.80µm | 0.30µm | 0.25µm |
| over 50 | up to 75 | ±0.50µm | 0.18µm | 0.15µm | ±1.00µm | 0.35µm | 0.25µm |
| over 75 | up to 100 | ±0.60µm | 0.20µm | 0.15µm | ±1.20µm | 0.35µm | 0.25µm |

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

(at 20°C)

| 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 .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 .4 | 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 |



An inspection certificate is supplied as standard. Refer to page X for details.

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

| ISO/DIN/JIS | | | |
|-------------|-------|------------------------|-------------------------|
| Suffix No. | Grade | Inspection Certificate | Calibration Certificate |
| -01B | K | ○ | ○ |

| ASME | | | |
|------------|-------|------------------------|-------------------------|
| Suffix No. | Grade | Inspection Certificate | Calibration Certificate |
| -51B | K | ○ | ○ |

| BS | | | |
|------------|-------|------------------------|-------------------------|
| Suffix No. | Grade | Inspection Certificate | Calibration Certificate |
| -11B | K | ○ | ○ |

* Only for 100mm 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 X for details.



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

Gauge Blocks with a 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 500mm.



SPECIFICATIONS

| Metric Blocks with CTE | | | Inch Blocks with CTE | | |
|------------------------|-------------------|-------------|----------------------|-------------------|---------------|
| Order No. (steel)* | Order No. (CERA)* | Length (mm) | Order No. (steel)* | Order No. (CERA)* | Length (inch) |
| 611681 | 613681 | 100 | 611204 | 613204 | 4 |
| 611802 | 613802 | 125 | 611205 | 613205 | 5 |
| 611803 | 613803 | 150 | 611206 | 613206 | 6 |
| 611804 | 613804 | 175 | 611207 | 613207 | 7 |
| 611682 | 613682 | 200 | 611208 | 613208 | 8 |
| 611805 | 613805 | 250 | 611222 | 613222 | 10 |
| 611683 | 613683 | 300 | 611223 | 613223 | 12 |
| 611684 | 613684 | 400 | 611224 | 613224 | 16 |
| 611685 | 613685 | 500 | 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 | 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.

ZERO CERA Blocks

- Thermal expansion in the temperature range 20±1°C 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. | | | 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 |

Gauge Blocks

Length Standards Brought to You by Mitutoyo



An inspection certificate is supplied as standard. Refer to page X 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 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

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 X for details.

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

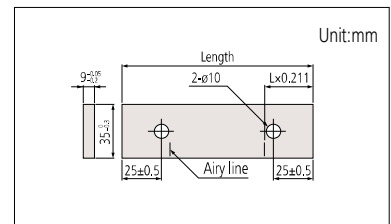


CERA 18-block set

CERA Long Block Sets



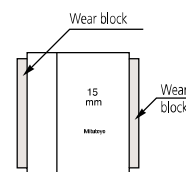
CERA 8-block set



CERA Wear Block Sets



CERA 2-block set



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

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

SPECIFICATIONS

1mm Base Block Sets

* 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.

| 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 | — | O: -#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 |
| 112 | 516-531 | 516-541 | — | — | — | 1.0005 | — | 1 |
| | 516-937 | 516-337 | K: -#0 | K: -#6 | K: -#1 | 1.001 - 1.009 | 0.001 | 9 |
| | 516-938 | 516-338 | O: -#0 | O: -#6 | O: -#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 | — | — | — | 1.005 | — | 1 |
| | 516-941 | 516-341 | K: -#0 | O: -#6 | K: -#1 | 1.01 - 1.49 | 0.01 | 49 |
| | 516-942 | 516-342 | O: -#0 | O: -#6 | O: -#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 | O: -#0 | — | O: -#1 | 1.01 - 1.49 | 0.01 | 49 |
| | 516-971 | 516-371 | 1: -#0 | — | 1: -#1 | 0.5 - 9.5 | 0.5 | 19 |
| 87 | 516-972 | 516-372 | 2: -#0 | — | 2: -#1 | 10 - 100 | 10 | 10 |
| | 516-535 | 515-543 | — | — | — | 1.001 - 1.009 | 0.001 | 9 |
| | 516-945 | 516-345 | K: -#0 | O: -#6 | K: -#1 | 1.01 - 1.49 | 0.01 | 49 |
| | 516-946 | 516-346 | O: -#0 | O: -#6 | O: -#1 | 0.5 - 9.5 | 0.5 | 19 |
| 76 | 516-947 | 516-347 | 1: -#0 | 1: -#6 | 1: -#1 | 10 - 100 | 10 | 10 |
| | 516-948 | 516-348 | 2: -#0 | 2: -#6 | 2: -#1 | — | — | — |
| | 516-949 | 516-349 | K: -#0 | — | — | 1.005 | — | 1 |
| | 516-950 | 516-350 | O: -#0 | — | — | 1.01 - 1.49 | 0.01 | 49 |
| 56 | 516-951 | 516-351 | 1: -#0 | — | — | 0.5 - 9.5 | 0.5 | 19 |
| | 516-952 | 516-352 | 2: -#0 | — | — | 10 - 40 | 10 | 4 |
| | 516-536 | 516-544 | — | — | — | 50 - 100 | 25 | 3 |
| | 516-953 | 516-353 | K: -#0 | K: -#6 | — | 0.5 | — | 1 |
| | 516-954 | 516-354 | O: -#0 | O: -#6 | — | 1.001 - 1.009 | 0.001 | 9 |
| 47 | 516-955 | 516-355 | 1: -#0 | 1: -#6 | — | 1.01 - 1.09 | 0.01 | 9 |
| | 516-956 | 516-356 | 2: -#0 | 2: -#6 | — | 1.1 - 1.9 | 0.1 | 9 |
| | 516-537 | 516-545 | — | — | — | 1.1 - 1.9 | 0.1 | 9 |
| | 516-957 | 516-357 | K: -#0 | O: -#6 | — | 1 - 24 | 1 | 24 |
| | 516-958 | 516-358 | O: -#0 | O: -#6 | — | 25 - 100 | 25 | 4 |
| 47 | 516-959 | 516-359 | 1: -#0 | 1: -#6 | — | 1.005 | — | 1 |
| | 516-960 | 516-360 | 2: -#0 | 2: -#6 | — | 1.01 - 1.09 | 0.01 | 9 |
| | 516-961 | 516-361 | K: -#0 | — | K: -#1 | 1.1 - 1.9 | 0.1 | 8 |
| | 516-962 | 516-362 | O: -#0 | — | O: -#1 | 1.2 - 1.9 | 0.1 | 8 |
| | 516-963 | 516-363 | 1: -#0 | — | 1: -#1 | 1 - 9 | 1 | 9 |
| 46 | 516-964 | 516-364 | 2: -#0 | — | 2: -#1 | 10 - 100 | 10 | 10 |
| | 516-994 | 516-394 | K: -#0 | — | — | 1.001 - 1.009 | 0.001 | 9 |
| | 516-995 | 516-395 | O: -#0 | — | — | 1.01 - 1.09 | 0.01 | 9 |
| | 516-996 | 516-396 | 1: -#0 | — | — | 1.1 - 1.9 | 0.1 | 9 |
| | 516-997 | 516-397 | 2: -#0 | — | — | 1 - 9 | 1 | 9 |
| 34 | — | — | — | — | — | 10 - 100 | 10 | 10 |
| | 516-128 | 516-178 | K: -#0 | — | K: -#1 | 1.0005 | — | 1 |
| | 516-129 | 516-179 | O: -#0 | — | O: -#1 | 1.001 - 1.009 | 0.001 | 9 |
| | 516-130 | 516-180 | 1: -#0 | — | 1: -#1 | 1.01 - 1.09 | 0.01 | 9 |
| | 516-131 | 516-181 | 2: -#0 | — | 2: -#1 | 1.1 - 1.9 | 0.1 | 9 |
| 32 | — | — | — | — | — | 1 - 5 | 1 | 5 |
| | 516-965 | 516-365 | K: -#0 | — | K: -#1 | 10 | — | 1 |
| | 516-966 | 516-366 | O: -#0 | — | O: -#1 | 1.005 | — | 1 |
| | 516-967 | 516-367 | 1: -#0 | — | 1: -#1 | 1.01 - 1.09 | 0.01 | 9 |
| | 516-968 | 516-368 | 2: -#0 | — | 2: -#1 | 1.1 - 1.9 | 0.1 | 9 |

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 | — | O: -#0 | — | — | 0.10 - 0.50 | 0.05 | 9 |
| | 516-991 | — | 1: -#0 | — | — | — | — | — |
| | 516-992 | — | 2: -#0 | — | — | — | — | — |
| | — | — | — | — | — | — | — | — |



An inspection certificate is supplied as standard. Refer to page X for details.

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

| ISO/DIN/JIS | | |
|-------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |
| 6 | ○ | ○ |

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

| ASME | | |
|------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |
| 6 | ○ | ○ |

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

| BS | | |
|------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |
| 6 | ○ | ○ |

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

Inspection Certificate





An inspection certificate is supplied as standard.
Refer to page X for details.

SPECIFICATIONS

0.001mm Step Block Set

* 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.

| 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 1.001 - 1.009 | 0.001 0.001 | 9 9 |
| | 516-974 | 516-374 | 0: -#0 | — | — | | | |
| | 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 | — | .10005 | | 1 |
| | 516-905 | 516-305 | — | 00: -#6 | — | .1001 - .1009 | .0001 | 9 |
| | 516-906 | 516-306 | — | 0: -#6 | 0: -#1 | .101 - .149 | .001 | 49 |
| | 516-907 | 516-307 | — | 1: -#6 | 1: -#1 | .05 - .95 | .05 | 19 |
| | 516-908 | 516-308 | — | 2: -#6 | 2: -#1 | 1 - 4 | 1 | 4 |
| 81 | 516-549 | 516-557 | — | K: -#6 | — | .1001 - .1009 | .0001 | 9 |
| | 516-901 | 516-301 | — | 00: -#6 | — | .101 - .149 | .001 | 49 |
| | 516-902 | 516-302 | — | 0: -#6 | 0: -#1 | .05 - .95 | .05 | 19 |
| | 516-903 | 516-303 | — | 1: -#6 | 1: -#1 | 1 - 4 | 1 | 4 |
| | 516-904 | 516-304 | — | 2: -#6 | 2: -#1 | | | |
| 49 | — | — | — | — | — | .1001 - .1009 | .0001 | 9 |
| | — | — | — | — | — | .101 - .109 | .001 | 9 |
| | 516-910 | — | — | — | 0: -#1 | .01 - .19 | .01 | 19 |
| | 516-911 | — | — | — | 1: -#1 | .2 - .9 | .1 | 8 |
| | 516-912 | — | — | — | 2: -#1 | 1 - 4 | 1 | 4 |
| 35 | 516-550 | 516-558 | — | K: -#6 | — | .10005 | | 1 |
| | 516-913 | 516-313 | — | 00: -#6 | — | .1001 - .1009 | .0001 | 9 |
| | 516-914 | 516-314 | — | 0: -#6 | 0: -#1 | .101 - .109 | .001 | 9 |
| | 516-915 | 516-315 | — | 1: -#6 | 1: -#1 | .11 - .19 | .01 | 9 |
| | 516-916 | 516-316 | — | 2: -#6 | 2: -#1 | .1 - .3 | .1 | 3 |
| | | | | | | 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 | — | .02005 | | 1 |
| | 516-917 | — | — | 00: -#6 | — | .0201 - .0209 | .0001 | 9 |
| | 516-918 | — | — | 0: -#6 | — | .021 - .029 | .001 | 9 |
| | 516-919 | — | — | 1: -#6 | — | .01 - .09 | .01 | 9 |
| | 516-920 | — | — | 2: -#6 | — | | | |
| 10 | 516-926 | — | — | 0: -#6 | 0: -#1 | .005 - .050 | .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 | — | .05 | | 2 |
| | 516-808 | 516-837 | — | 1: -#6 | — | | | |
| 2 | 516-805 | 516-834 | — | 0: -#6 | — | .1 | | 2 |
| | 516-804 | 516-835 | — | 1: -#6 | — | | | |

Gauge Blocks

Length Standards Brought to You by Mitutoyo



An inspection certificate is supplied as standard. Refer to page X 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"). 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

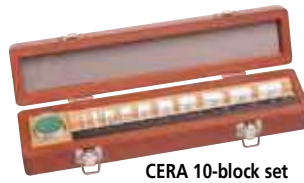


Steel 10-block set

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.



(The gauge blocks are optional.)



516-607

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) | .105, .210, .315, .420, .5, .605, .710, .815, .920, 1 |



An inspection certificate is supplied as standard.
Refer to page X for details.

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

| ISO/DIN/JIS | | |
|-------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |
| 6 | ○ | ○ |

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

| ASME | | |
|------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |
| 6 | ○ | ○ |

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

| BS | | |
|------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |

Inspection Certificate



SPECIFICATIONS

| 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 | 516-161 | 0: -■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) |
| | 516-112 | 516-162 | 1: -■0 | — | — | |
| | 516-113 | 516-163 | 2: -■0 | — | — | |
| 10 | 516-977 | — | K: -■0 | — | — | 1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25mm, Optical parallel (t = 12mm) |
| | 516-978 | 516-378 | 0: -■0 | — | — | |
| | 516-979 | 516-379 | 1: -■0 | — | — | |
| | 516-980 | 516-380 | 2: -■0 | — | — | |
| 10 | 516-103 | 516-152 | 0: -■0 | 0: -■6 | — | 1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25mm |
| | 516-101 | 516-153 | 1: -■0 | 1: -■6 | — | |
| | — | 516-154 | 2: -■0 | — | — | |
| 10 | 516-580 | 516-390 | 0: -■0 | — | — | 2.2, 4.8, 7.8, 10.4, 12, 15.2, 17.4, 19.6, 22.6, 25mm |
| | 516-581 | 516-391 | 1: -■0 | — | — | |
| | 516-582 | 516-392 | 2: -■0 | — | — | |
| 10 | 516-106 | 516-156 | 0: -■0 | — | — | 2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25mm, Optical parallel (t = 12mm) |
| | 516-107 | 516-157 | 1: -■0 | — | — | |
| | 516-108 | 516-158 | 2: -■0 | — | — | |
| 10 | 516-132 | 516-182 | 0: -■0 | — | — | 1.25, 1.50, 1, 2, 3, 5, 10, 15, 20, 25mm, Micro Checker, Optical parallel (t = 12mm) |
| | 516-133 | 516-183 | 1: -■0 | — | — | |
| | 516-134 | 516-184 | 2: -■0 | — | — | |
| 10 | 516-135 | 516-185 | 0: -■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) |
| | 516-136 | 516-186 | 1: -■0 | — | — | |
| | 516-137 | 516-187 | 2: -■0 | — | — | |
| 8 | — | 516-547 | — | K: -■6 | — | 25, 50, 75, 100, 125, 150, 175, 200mm |
| | — | 516-164 | K: -■0 | 00: -■6 | — | |
| | 516-115 | 516-165 | 0: -■0 | 0: -■6 | — | |
| | 516-116 | 516-166 | 1: -■0 | 1: -■6 | — | |
| | 516-117 | 516-167 | 2: -■0 | 2: -■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 | |
| 10 | 516-528 | 516-318 | — | 00: -■6 | 0: -■1 | .087, .189, .307, .409, .472, .598, .669, .772, .890, 1" |
| | 516-529 | 516-319 | — | 0: -■6 | 1: -■1 | |
| | 516-530 | 516-320 | — | 1: -■6 | 2: -■1 | |
| 10 | 516-552 | 516-559 | — | K: -■6 | — | .105, .210, .315, .420, .500, .605, .710, .815, .920, 1", Optical parallel (t = .5") |
| | 516-921 | 516-321 | — | 00: -■6 | 0: -■1 | |
| | 516-922 | 516-322 | — | 0: -■6 | 1: -■1 | |
| | 516-923 | 516-323 | — | 1: -■6 | 2: -■1 | |
| 10 | 516-553 | 516-560 | — | K: -■6 | — | .105, .210, .315, .420, .500, .605, .710, .815, .920, 1", Micro checker, Optical parallel (t = .5") |
| | 516-138 | 516-188 | — | 00: -■6 | 0: -■1 | |
| | 516-139 | 516-189 | — | 0: -■6 | 1: -■1 | |
| | 516-140 | 516-190 | — | 1: -■6 | 2: -■1 | |
| 9 | 516-554 | 516-561 | — | K: -■6 | — | .0625, .100, .125, .200, .250, .300, .500, 1, 2", Optical parallel (t = .5") |
| | 516-929 | 516-333 | — | 00: -■6 | — | |
| | 516-930 | 516-334 | — | 0: -■6 | — | |
| | 516-931 | 516-335 | — | 1: -■6 | — | |
| 9 | 516-555 | 516-562 | — | K: -■6 | — | .0625, .100, .125, .200, .250, .300, .500, 1, 2", Micro Checker, Optical parallel (t = .5") |
| | 516-141 | 516-191 | — | 00: -■6 | — | |
| | 516-142 | 516-192 | — | 0: -■6 | — | |
| | 516-143 | 516-193 | — | 1: -■6 | — | |
| 9 | — | 516-563 | — | K: -■6 | — | .0625, .100, .125, .200, .250, .300, .500, 1, 2" |
| | — | 516-329 | — | 00: -■6 | — | |
| | 516-934 | 516-330 | — | 0: -■6 | — | |
| | 516-935 | 516-331 | — | 1: -■6 | — | |
| 8 | 516-126 | 516-176 | — | 0: -■6 | — | 1, 2, 3, 4, 5, 6, 7, 8" |
| | 516-127 | 516-177 | — | 1: -■6 | — | |
| | — | — | — | — | — | |

SERIES 516 – Caliper Inspection Gauge Block Sets

SPECIFICATIONS

| 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 | 516-566 | 1: -10 | — | — | 4 pcs.: 10, 30, 50, 125mm, Setting ring (ø4mm, ø10mm), Pin gage (ø10mm), Glove |
| | 516-527 | 516-567 | 2: -10 | — | — | |
| 3 | 516-124 | 516-150 | 1: -10 | — | — | 3 pcs.: 30, 41.3, 131.4mm, Setting ring (ø4mm, ø25mm), Glove |
| | 516-125 | 516-151 | 2: -10 | — | — | |
| 2 | 516-122 | 516-172 | 1: -10 | — | — | 2 pcs.: 41.3, 131.4mm, Setting ring (ø20mm), Glove |
| | 516-123 | 516-173 | 2: -10 | — | — | |

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Metric Rectangular Gauge Blocks

- 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.



SPECIFICATIONS

Metric Blocks

* 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.

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



An inspection certificate is supplied as standard. Refer to page X for details.

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

| ISO/DIN/JIS | | | | |
|-------------|-------|------------------------|-------------------------|-----|
| Suffix No. | Grade | Inspection Certificate | Calibration Certificate | |
| | | | JCSS | RvA |
| -016 | K | ○ | ○ | — |
| -021 | 0 | ○ | — | — |
| -026 | 0 | ○ | ○ | — |
| -031 | 1 | ○ | — | — |
| -036 | 1 | ○ | ○ | — |
| -041 | 2 | ○ | — | — |
| -046 | 2 | ○ | ○ | — |

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

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



Inspection Certificate

E

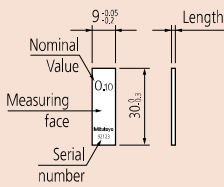


An inspection certificate is supplied as standard. Refer to page X for details.

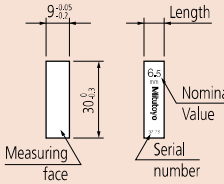
Dimensions

Unit: mm

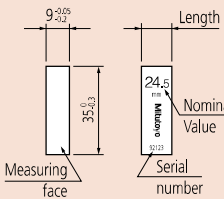
Nominal length:
0.1mm - 5.5mm
(.004" - .25")



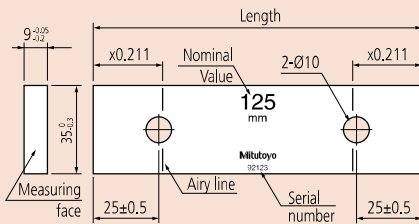
Nominal length:
6mm - 10mm
(.3" - .4")



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



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



* 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.

| Length (mm) | Order No.* | | Length (mm) | Order No.* | | Length (mm) | Order No.* | |
|-------------|------------|--------|-------------|------------|--------|-------------|------------|--------|
| | Steel | CERA | | Steel | CERA | | Steel | CERA |
| 1.2 | 611580 | 613580 | 2.17 | 611717 | — | 13 | 611623 | 613623 |
| 1.21 | 611581 | 613581 | 2.18 | 611718 | — | 13.5 | 611653 | 613653 |
| 1.22 | 611582 | 613582 | 2.19 | 611719 | — | 14 | 611624 | 613624 |
| 1.23 | 611583 | 613583 | 2.2 | 611720 | — | 14.5 | 611654 | 613654 |
| 1.24 | 611584 | 613584 | 2.21 | 611721 | — | 15 | 611625 | 613625 |
| 1.25 | 611585 | 613585 | 2.22 | 611722 | — | 15.5 | 611655 | 613655 |
| 1.26 | 611586 | 613586 | 2.23 | 611723 | — | 16 | 611626 | 613626 |
| 1.27 | 611587 | 613587 | 2.24 | 611724 | — | 16.5 | 611656 | 613656 |
| 1.28 | 611588 | 613588 | 2.25 | 611725 | — | 17 | 611627 | 613627 |
| 1.29 | 611589 | 613589 | 2.26 | 611726 | — | 17.5 | 611657 | 613657 |
| 1.3 | 611590 | 613590 | 2.27 | 611727 | — | 17.6 | 611854 | 613854 |
| 1.31 | 611591 | 613591 | 2.28 | 611728 | — | 18 | 611628 | 613628 |
| 1.32 | 611592 | 613592 | 2.29 | 611729 | — | 18.5 | 611658 | 613658 |
| 1.33 | 611593 | 613593 | 2.3 | 611730 | — | 19 | 611629 | 613629 |
| 1.34 | 611594 | 613594 | 2.31 | 611731 | — | 19.5 | 611659 | 613659 |
| 1.35 | 611595 | 613595 | 2.32 | 611732 | — | 20 | 611627 | 613627 |
| 1.36 | 611596 | 613596 | 2.33 | 611733 | — | 20.2 | 611855 | 613855 |
| 1.37 | 611597 | 613597 | 2.34 | 611734 | — | 20.5 | 611660 | 613660 |
| 1.38 | 611598 | 613598 | 2.35 | 611735 | — | 21 | 611631 | 613631 |
| 1.39 | 611599 | 613599 | 2.36 | 611736 | — | 21.5 | 611661 | 613661 |
| 1.4 | 611600 | 613600 | 2.37 | 611737 | — | 22 | 611632 | 613632 |
| 1.41 | 611601 | 613601 | 2.38 | 611738 | — | 22.5 | 611662 | 613662 |
| 1.42 | 611602 | 613602 | 2.39 | 611739 | — | 22.8 | 611856 | 613856 |
| 1.43 | 611603 | 613603 | 2.4 | 611740 | — | 23 | 611633 | 613633 |
| 1.44 | 611604 | 613604 | 2.41 | 611741 | — | 23.5 | 611663 | 613663 |
| 1.45 | 611605 | 613605 | 2.42 | 611742 | — | 24 | 611634 | 613634 |
| 1.46 | 611606 | 613606 | 2.43 | 611743 | — | 24.5 | 611664 | 613664 |
| 1.47 | 611607 | 613607 | 2.44 | 611744 | — | 25 | 611635 | 613635 |
| 1.48 | 611608 | 613608 | 2.45 | 611745 | — | 25.25 | 611754 | 613754 |
| 1.49 | 611609 | 613609 | 2.46 | 611746 | — | 30 | 611673 | 613673 |
| 1.5 | 611641 | 613641 | 2.47 | 611747 | — | 35 | 611755 | 613755 |
| 1.6 | 611516 | 613516 | 2.48 | 611748 | — | 40 | 611674 | 613674 |
| 1.7 | 611517 | 613517 | 2.49 | 611749 | — | 41.3 | 611857 | 613857 |
| 1.8 | 611518 | 613518 | 2.5 | 611642 | 613642 | 45 | 611756 | 613756 |
| 1.9 | 611519 | 613519 | 2.6 | 611750 | — | 50 | 611675 | 613675 |
| 2 | 611612 | 613612 | 2.7 | 611751 | — | 60 | 611676 | 613676 |
| 2.0005 | 611690 | — | 2.8 | 611752 | — | 70 | 611677 | 613677 |
| 2.001 | 611691 | — | 2.9 | 611753 | — | 75 | 611801 | 613801 |
| 2.002 | 611692 | — | 3 | 611613 | 613613 | 80 | 611678 | 613678 |
| 2.003 | 611693 | — | 3.5 | 611643 | 613643 | 90 | 611679 | 613679 |
| 2.004 | 611694 | — | 4 | 611614 | 613614 | 100 | 611681 | 613681 |
| 2.005 | 611695 | — | 4.5 | 611644 | 613644 | 125 | 611802 | 613802 |
| 2.006 | 611696 | — | 5 | 611615 | 613615 | 131.4 | 611858 | 613858 |
| 2.007 | 611697 | — | 5.1 | 611850 | 613850 | 150 | 611803 | 613803 |
| 2.008 | 611698 | — | 5.5 | 611645 | 613645 | 175 | 611804 | 613804 |
| 2.009 | 611699 | — | 6 | 611616 | 613616 | 200 | 611682 | 613682 |
| 2.01 | 611701 | — | 6.5 | 611646 | 613646 | 250 | 611805 | 613805 |
| 2.02 | 611702 | — | 7 | 611617 | 613617 | 300 | 611683 | 613683 |
| 2.03 | 611703 | — | 7.5 | 611647 | 613647 | 400 | 611684 | 613684 |
| 2.04 | 611704 | — | 7.7 | 611851 | 613851 | 500 | 611685 | 613685 |
| 2.05 | 611705 | — | 8 | 611618 | 613618 | 600 | 611840 | — |
| 2.06 | 611706 | — | 8.5 | 611648 | 613648 | 700 | 611841 | — |
| 2.07 | 611707 | — | 9 | 611619 | 613619 | 750 | 611842 | — |
| 2.08 | 611708 | — | 9.5 | 611649 | 613649 | 800 | 611843 | — |
| 2.09 | 611709 | — | 10 | 611671 | 613671 | 900 | 611844 | — |
| 2.1 | 611710 | — | 10.3 | 611852 | 613852 | 1000 | 611845 | — |
| 2.11 | 611711 | — | 10.5 | 611650 | 613650 | | | |
| 2.12 | 611712 | — | 11 | 611621 | 613621 | | | |
| 2.13 | 611713 | — | 11.5 | 611651 | 613651 | | | |
| 2.14 | 611714 | — | 12 | 611622 | 613622 | | | |
| 2.15 | 611715 | — | 12.5 | 611652 | 613652 | | | |
| 2.16 | 611716 | — | 12.9 | 611853 | 613853 | | | |

Metric Wear Blocks

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

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Inch Rectangular Gauge Blocks

SPECIFICATIONS

Inch Block

* 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.

| Length (inch) | Order No.* | | Length (inch) | Order No.* | | Length (inch) | Order No.* | |
|---------------|------------|------|----------------|------------|--------|----------------|------------|--------|
| | Steel | CERA | | Steel | CERA | | Steel | CERA |
| .004 | 611304 | — | .024 | 611324 | — | .0625 | 611303 | 613303 |
| .005 | 611305 | — | .025 | 611325 | — | .07 | 611107 | — |
| .006 | 611306 | — | .026 | 611326 | — | .078125 (5/64) | 611103 | 613100 |
| .007 | 611307 | — | .027 | 611327 | — | .08 | 611108 | — |
| .008 | 611308 | — | .028 | 611328 | — | .09 | 611109 | — |
| .009 | 611309 | — | .029 | 611329 | — | .09375 (3/32) | 611104 | 613101 |
| .01 | 611310 | — | .03 | 611330 | — | .1 | 611191 | 613191 |
| .011 | 611311 | — | .031 | 611331 | — | .100025 | 611111 | 613110 |
| .012 | 611312 | — | .03125 (1/32) | 611101 | 613103 | .10005 | 611135 | 613135 |
| .013 | 611313 | — | .032 | 611332 | — | .100075 | 611112 | 613111 |
| .014 | 611314 | — | .033 | 611333 | — | .1001 | 611121 | 613121 |
| .015 | 611315 | — | .034 | 611334 | — | .1002 | 611122 | 613122 |
| .016 | 611316 | — | .035 | 611335 | — | .1003 | 611123 | 613123 |
| .017 | 611317 | — | .036 | 611336 | — | .1004 | 611124 | 613124 |
| .018 | 611318 | — | .037 | 611337 | — | .1005 | 611125 | 613125 |
| .019 | 611319 | — | .038 | 611338 | — | .1006 | 611126 | 613126 |
| .02 | 611320 | — | .039 | 611339 | — | .1007 | 611127 | 613127 |
| .02005 | 611240 | — | .04 | 611340 | — | .1008 | 611128 | 613128 |
| .0201 | 611231 | — | .041 | 611341 | — | .1009 | 611129 | 613129 |
| .0202 | 611232 | — | .042 | 611342 | — | .101 | 611141 | 613141 |
| .0203 | 611233 | — | .043 | 611343 | — | .102 | 611142 | 613142 |
| .0204 | 611234 | — | .044 | 611344 | — | .103 | 611143 | 613143 |
| .0205 | 611235 | — | .045 | 611345 | — | .104 | 611144 | 613144 |
| .0206 | 611236 | — | .046 | 611346 | — | .105 | 611145 | 613145 |
| .0207 | 611237 | — | .046875 (3/64) | 611102 | 613104 | .106 | 611146 | 613146 |
| .0208 | 611238 | — | .047 | 611347 | — | .107 | 611147 | 613147 |
| .0209 | 611239 | — | .048 | 611348 | — | .108 | 611148 | 613148 |
| .021 | 611321 | — | .049 | 611349 | — | .109 | 611149 | 613149 |
| .022 | 611322 | — | .05 | 611105 | 613105 | .109375 (7/64) | 611110 | 613102 |
| .023 | 611323 | — | .06 | 611106 | — | | | |



An inspection certificate is supplied as standard. Refer to page X for details.

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

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

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



E

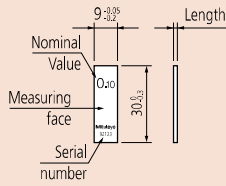


An inspection certificate is supplied as standard.
Refer to page X for details.

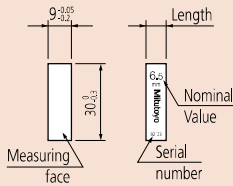
Dimensions

Unit: mm

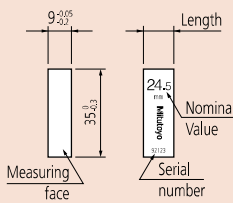
Nominal length:
0.1mm - 5.5mm
(.004" - .25")



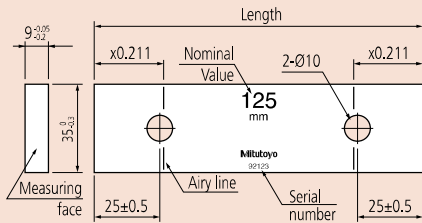
Nominal length:
6mm - 10mm
(.3" - .4")



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



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



SPECIFICATIONS

Inch Block

* 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.

| Length (inch) | Order No.* | | Length (inch) | Order No.* | | Length (inch) | Order No.* | |
|---------------|------------|--------|---------------|------------|--------|---------------|------------|--------|
| | Steel | CERA | | Steel | CERA | | Steel | CERA |
| .11 | 611150 | 613150 | .139 | 611179 | 613179 | .605 | 611211 | 613211 |
| .111 | 611151 | 613151 | .14 | 611180 | 613180 | .65 | 611216 | 613216 |
| .112 | 611152 | 613152 | .141 | 611181 | 613181 | .7 | 611197 | 613197 |
| .113 | 611153 | 613153 | .142 | 611182 | 613182 | .710 | 611220 | 613220 |
| .114 | 611154 | 613154 | .143 | 611183 | 613183 | .75 | 611217 | 613217 |
| .115 | 611155 | 613155 | .144 | 611184 | 613184 | .8 | 611198 | 613198 |
| .116 | 611156 | 613156 | .145 | 611185 | 613185 | .815 | 611226 | 613226 |
| .117 | 611157 | 613157 | .146 | 611186 | 613186 | .85 | 611218 | 613218 |
| .118 | 611158 | 613158 | .147 | 611187 | 613187 | .9 | 611199 | 613199 |
| .119 | 611159 | 613159 | .148 | 611188 | 613188 | .920 | 611227 | 613227 |
| .12 | 611160 | 613160 | .149 | 611189 | 613189 | .95 | 611219 | 613219 |
| .121 | 611161 | 613161 | .15 | 611115 | 613115 | 1 | 611201 | 613201 |
| .122 | 611162 | 613162 | .16 | 611116 | 613116 | 2 | 611202 | 613202 |
| .123 | 611163 | 613163 | .17 | 611117 | 613117 | 3 | 611203 | 613203 |
| .124 | 611164 | 613164 | .18 | 611118 | 613118 | 4 | 611204 | 613204 |
| .125 | 611165 | 613165 | .19 | 611119 | 613119 | 5 | 611205 | 613205 |
| .126 | 611166 | 613166 | .2 | 611192 | 613192 | 6 | 611206 | 613206 |
| .127 | 611167 | 613167 | .21 | 611221 | 613221 | 7 | 611207 | 613207 |
| .128 | 611168 | 613168 | .25 | 611212 | 613212 | 8 | 611208 | 613208 |
| .129 | 611169 | 613169 | .3 | 611193 | 613193 | 10 | 611222 | 613222 |
| .13 | 611170 | 613170 | .315 | 611209 | 613209 | 12 | 611223 | 613223 |
| .131 | 611171 | 613171 | .35 | 611213 | 613213 | 16 | 611224 | 613224 |
| .132 | 611172 | 613172 | .375 (3/8) | 611113 | 613112 | 20 | 611225 | 613225 |
| .133 | 611173 | 613173 | .4 | 611194 | 613194 | | | |
| .134 | 611174 | 613174 | .420 | 611210 | 613210 | | | |
| .135 | 611175 | 613175 | .45 | 611214 | 613214 | | | |
| .136 | 611176 | 613176 | .5 | 611195 | 613195 | | | |
| .137 | 611177 | 613177 | .55 | 611215 | 613215 | | | |
| .138 | 611178 | 613178 | .6 | 611196 | 613196 | | | |

Inch Wear Blocks

| Length (inch) | Order No.* Tungsten carbide |
|---------------|--------------------------------|
| .05 | 612105 |
| .1 | 612191 |

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Rectangular Gauge Blocks 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 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. | Set | | Qty |
|--------------------------|----------------|-------------------|-------------------|-----------------|
| | | 22 pcs 516-601 | 14 pcs 516-602 | |
| Holder | 619002 | — | ○ | 1 pc. |
| | 619003 | ○ | ○ | |
| | 619004 | ○ | ○ | |
| | 619005 | ○ | ○ | |
| Base | 619009 | ○ | ○ | One pair (2pcs) |
| | 619010 | ○ | ○ | |
| Half round jaw | 619011 | ○ | ○ | One pair (2pcs) |
| | 619012 | ○ | ○ | |
| | 619013 | ○ | — | |
| | 619014 | ○ | — | |
| Plain jaw | 619018 | ○ | — | 1 pc. |
| Scriber point | 619019 | ○ | ○ | |
| Center point | 619020 | ○ | ○ | One pair (2pcs) |
| Tram point | 619021 | ○ | — | |
| Triangular straight edge | 619022 | ○ | ○ | 1 pc. |
| | 619023 | ○ | — | |

* 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).



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



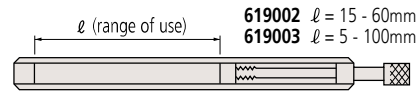
Marking a workpiece using the base, a holder and the scriber point



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

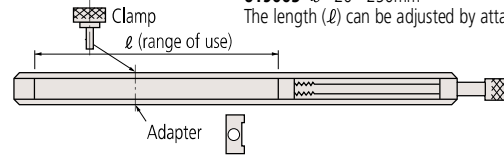
Holder

Thickness = 15mm
Width = 29.5mm

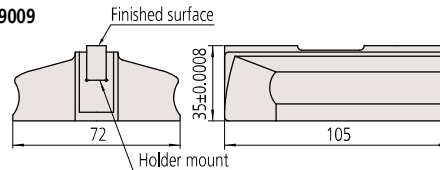


619004 $\ell = 15 - 160\text{mm}$
619005 $\ell = 20 - 250\text{mm}$

The length (ℓ) can be adjusted by attaching/removing the adapter.



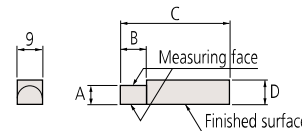
Base 619009



Flatness tolerance of the finished surface $0.5\mu\text{m}$
Flatness tolerance of the bottom surface $1\mu\text{m}$

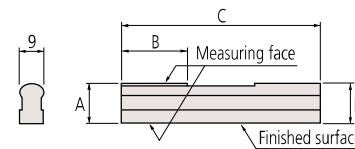
Half round jaw

Type I



Flatness tolerance of the finished surface $0.5\mu\text{m}$

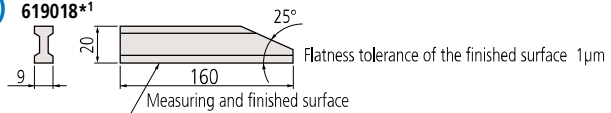
Type II



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 |

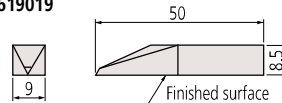
Plain jaw (B type) 619018*¹



Flatness tolerance of the finished surface $1\mu\text{m}$

Scriber point

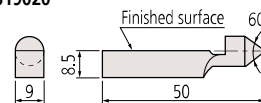
619019



Flatness tolerance of the finished surface $0.5\mu\text{m}$

Center point

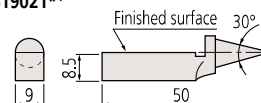
619020



Eccentricity tolerance of the point $\pm 10\mu\text{m}$
Flatness tolerance of the finished surface $0.5\mu\text{m}$

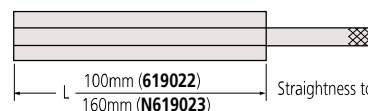
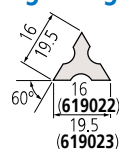
Tram point

619021*¹



Eccentricity tolerance of the point $\pm 10\mu\text{m}$
Flatness tolerance of the finished surface $0.5\mu\text{m}$

Triangular straight edge



Straightness tolerance of the edge $1.2\mu\text{m}$

*1 Qty: One pair (2 pcs)

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Accessories for Rectangular Gauge Blocks over 100mm SERIES 516

- Specially designed for standard size gauge blocks over 125mm which have two coupling holes on the body: coupling of two long gauge blocks and attachment of jaws is possible.
- These accessories can also be used for CERA blocks.

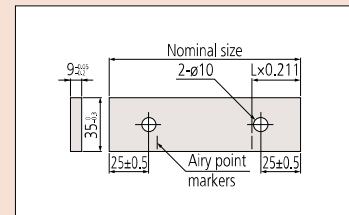


516-605
(14 pcs)

SPECIFICATIONS

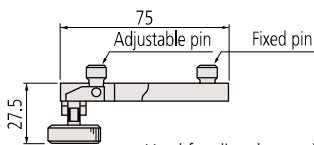
| Set Order No. | Individual Item Order No. | Item Description | Quantity Supplied |
|---------------|---------------------------|------------------|-------------------|
| 516-605 | 619031 | Connector A | 1 pc. |
| | 619032 | Connector B | |
| | 619033 | Connector C | |
| | 619034 | Connector D | |
| | 619035 | Connector E | 3 pcs. |
| | 619036 | Adapter | |
| | 619009 | Base | |
| | 619013 | Half round jaw | One pair (2pcs) |
| | 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).



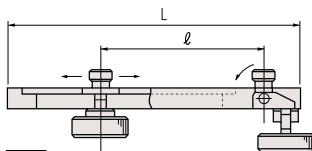
Coupling holes in long gauge blocks

Connector A 619031



Used for directly coupling two long gauge blocks.

Connectors B and C



Adapter 619036

| | 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.

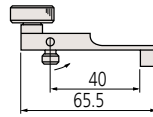


Use of B-type connectors in gage construction



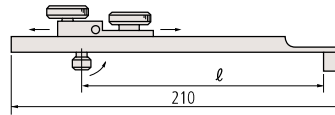
Setting a dial test indicator to a long-gauge-block stack attached to the base with a D-type connector

Connector D 619034



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

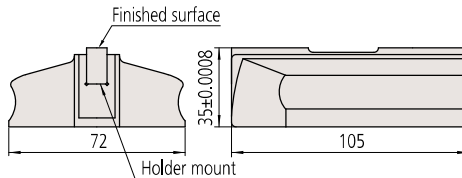
Connector E 619035



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.

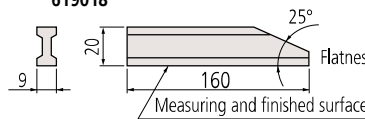
Adapter 619036 (1pc.)

Base 619009



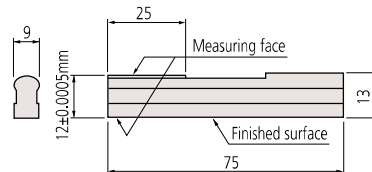
Flatness tolerance of the finished surface 0.5μm
Flatness tolerance of the bottom surface 1μm

Plain jaw 619018*2



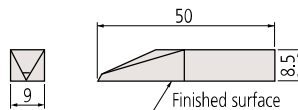
Flatness tolerance of the finished surface 1μm

Half round jaw 619013*2



Flatness tolerance of the finished surface 0.5μm

Scriber point 619019



Flatness tolerance of the finished surface 0.5μm

Assortment of accessories for gauge blocks

For inside and outside measurement inspection of 300 to 1000 mm (every 100mm) gauge blocks, select the appropriate combination of a rectangular gauge block and an accessory.

| Items | 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 gauge block (nominal dimension) | 200mm 611682 | | | | | | | 1 | 1 | | | | | | | | |
| | 300mm 611683 | 1 | 1 | | | | | | | 1 | 1 | 1 | 1 | | | | |
| | 400mm 611684 | | | 1 | 1 | | | | 1 | 1 | 1 | 1 | | | 1 | 1 | |
| | 500mm 611685 | | | | | 1 | 1 | | | | | | 1 | 1 | 1 | 1 | 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 | 619013 | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Adapter | 619036 | (2) | | (2) | | (2) | | (2) | | (2) | | (2) | | (2) | | (2) | |

*1 Provided with adapters (2 pcs)
*2 2 pcs/set

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo



An inspection certificate is supplied as standard. Refer to page X 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 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.



An inspection certificate is supplied as standard.
Refer to page X for details.

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

| ISO/DIN/JIS | | |
|-------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |
| 6 | ○ | ○ |

| ASME | | |
|------------|------------------------|-------------------------|
| Suffix No. | Inspection Certificate | Calibration Certificate |
| 1 | ○ | — |



Inspection Certificate

SPECIFICATIONS

| Metric Block Sets | | | | | | | |
|-------------------|-----------|------|----------------------------|---------|------------------------|-------|------|
| Blocks per set | Order No. | | Standard / grade available | | Blocks included in set | | |
| | Steel | CERA | ISO/DIN/JIS | ASME | Size | Step | Qty. |
| 112 | 516-437 | — | — | 00: -H6 | 1.005 | — | 1 |
| | 516-438 | — | 0: -H0 | 0: -H6 | 1.001 - 1.009 | 0.001 | 9 |
| | 516-439 | — | 1: -H0 | 1: -H6 | 1.01 - 1.49 | 0.01 | 49 |
| | 516-440 | — | 2: -H0 | 2: -H6 | 0.5 - 24.5 | 0.5 | 49 |
| | — | — | — | — | 25 - 100 | 25 | 4 |
| 103 | 516-441 | — | — | 00: -H6 | 1.005 | — | 1 |
| | 516-442 | — | 0: -H0 | 0: -H6 | 1.01 - 1.49 | 0.01 | 49 |
| | 516-443 | — | 1: -H0 | 1: -H6 | 0.5 - 24.5 | 0.5 | 49 |
| | 516-444 | — | 2: -H0 | 2: -H6 | 25 - 100 | 25 | 4 |
| 76 | 516-449 | — | — | 00: -H6 | 1.005 | — | 1 |
| | 516-450 | — | 0: -H0 | 0: -H6 | 1.01 - 1.49 | 0.01 | 49 |
| | 516-451 | — | 1: -H0 | 1: -H6 | 0.5 - 9.5 | 0.5 | 19 |
| | 516-452 | — | 2: -H0 | 2: -H6 | 10 - 40 | 10 | 4 |
| | — | — | — | — | 50 - 100 | 25 | 3 |
| 47 | 516-457 | — | — | 00: -H6 | 1.005 | — | 1 |
| | 516-458 | — | 0: -H0 | 0: -H6 | 1.01 - 1.09 | 0.01 | 9 |
| | 516-459 | — | 1: -H0 | 1: -H6 | 1.1 - 1.9 | 0.1 | 9 |
| | 516-460 | — | 2: -H0 | 2: -H6 | 1 - 24 | 1 | 24 |
| | — | — | — | — | 25 - 100 | 25 | 4 |
| 32 | 516-465 | — | — | 00: -H6 | 1.005 | — | 1 |
| | 516-466 | — | 0: -H0 | 0: -H6 | 1.01 - 1.09 | 0.01 | 9 |
| | 516-467 | — | 1: -H0 | 1: -H6 | 1.1 - 1.9 | 0.1 | 9 |
| | 516-468 | — | 2: -H0 | 2: -H6 | 1 - 9 | 1 | 9 |
| | — | — | — | — | 10 - 30 | 10 | 3 |
| — | — | — | — | 60 | — | 1 | |

| Metric Long Block Sets | | | | | | | |
|------------------------|-----------|------|----------------------------|---------|------------------------|------|------|
| Blocks per set | Order No. | | Standard / grade available | | Blocks included in set | | |
| | Steel | CERA | ISO/DIN/JIS | ASME | Size | Step | Qty. |
| 8 | 516-751 | — | — | 00: -H6 | 125, 150, 175 | 25 | 3 |
| | 516-752 | — | 0: -H0 | 0: -H6 | 200, 250 | 50 | 2 |
| | 516-753 | — | 1: -H0 | 1: -H6 | 300, 400, 500 | 100 | 3 |
| | 516-754 | — | 2: -H0 | 2: -H6 | — | — | — |

| Metric Wear Block Sets | | | | | | | |
|------------------------|-----------|------|----------------------------|------|------------------------|------|------|
| Blocks per set | Order No. | | Standard / grade available | | Blocks included in set | | |
| | Steel | CERA | ISO/DIN/JIS | ASME | Size | Step | Qty. |
| 2 | 516-820 | — | 0: -H0 | — | 1 | — | 2 |
| | 516-821 | — | 1: -H0 | — | — | — | — |
| 2 | 516-822 | — | 0: -H0 | — | 2 | — | 2 |
| | 516-823 | — | 1: -H0 | — | — | — | — |

| Inch Block Sets | | | | | | | |
|-----------------|-----------|---------|----------------------------|---------|------------------------|-------|------|
| Blocks per set | Order No. | | Standard / grade available | | Blocks included in set | | |
| | Steel | CERA | ISO/DIN/JIS | ASME | Size | Step | Qty. |
| 81 | 516-401 | 516-201 | — | 00: -H6 | .1001 - .1009 | .0001 | 9 |
| | 516-402 | 516-202 | — | 0: -H6 | .101 - .149 | .001 | 49 |
| | 516-403 | 516-203 | — | 1: -H6 | .05 - .95 | .05 | 19 |
| | 516-404 | 516-204 | — | 2: -H6 | 1 - 4 | 1 | 4 |
| 36 | 516-421 | 516-221 | — | 00: -H6 | .05" | — | 1 |
| | 516-422 | 516-222 | — | 0: -H6 | .1001 - .1009 | .0001 | 9 |
| | 516-423 | 516-223 | — | 1: -H6 | .101 - .109 | .001 | 9 |
| | 516-424 | 516-224 | — | 2: -H6 | .11 - .19 | .01 | 9 |
| | — | — | — | — | .1 - .5 | .1 | 5 |
| 28 | 516-417 | — | — | 00: -H6 | .02005 | — | 1 |
| | 516-418 | — | — | 0: -H6 | .0201-.0209 | .0001 | 9 |
| | 516-419 | — | — | 1: -H6 | .021-.029 | .001 | 9 |
| | 516-420 | — | — | 2: -H6 | .010-.090 | .01 | 9 |
| | — | — | — | — | — | — | — |

| Inch Long Block Sets | | | | | | | |
|----------------------|-----------|------|----------------------------|--------|------------------------|------|------|
| Blocks per set | Order No. | | Standard / grade available | | Blocks included in set | | |
| | Steel | CERA | ISO/DIN/JIS | ASME | Size | Step | Qty. |
| 8 | 516-762 | — | — | 0: -H0 | 5 - 7 | 1 | 3 |
| | 516-763 | — | — | 1: -H0 | 8, 10, 12 | 2 | 3 |
| | — | — | — | — | 16, 20 | 4 | 2 |

| Inch Wear Block Sets | | | | | | | |
|----------------------|-----------|---------|----------------------------|--------|------------------------|------|------|
| Blocks per set | Order No. | | Standard / grade available | | Blocks included in set | | |
| | Carbide | CERA | ISO/DIN/JIS | ASME | Size | Step | Qty. |
| 2 | 516-824 | 516-846 | — | 0: -H0 | .05 | — | 2 |
| | 516-825 | 516-847 | — | 1: -H0 | — | — | — |
| 2 | 516-826 | 516-844 | — | 0: -H0 | .1 | — | 2 |
| | 516-827 | 516-845 | — | 1: -H0 | — | — | — |

Gauge Blocks

Length Standards Brought to You by Mitutoyo



An inspection certificate is supplied as standard. Refer to page X for details.

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

* Details of the overall sizes for forms of block are given on page E-3 and E24, and the accuracy standards to which they are manufactured are given on page E-5.

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

| Metric Wear Blocks | |
|--------------------|----------------------------|
| Length (mm) | Order No. Tungsten carbide |
| 1 | 615611 |
| 2 | 615612 |

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

| ISO/DIN/JIS | | | |
|-------------|-------|------------------------|------------------------------|
| Suffix No. | Grade | Inspection Certificate | Calibration Certificate JCSS |
| -021 | 0 | ○ | — |
| -026 | 0 | ○ | ○ |
| -031 | 1 | ○ | — |
| -036 | 1 | ○ | ○ |
| -041 | 2 | ○ | — |
| -046 | 2 | ○ | ○ |

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



Inspection Certificate

E



An inspection certificate is supplied as standard. Refer to page X for details.

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

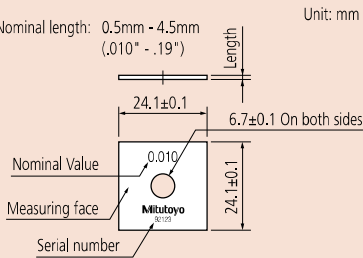
| ASME | | | |
|------------|-------|------------------------|-------------------------|
| Suffix No. | Grade | Inspection Certificate | Calibration Certificate |
| -521 | 00 | ○ | — |
| -531 | 0 | ○ | — |
| -541 | 1 | ○ | — |
| -551 | 2 | ○ | — |



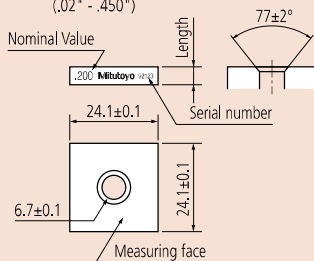
Inspection Certificate

Dimensions

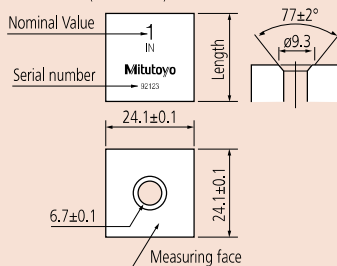
Nominal length: 0.5mm - 4.5mm
(.010" - .19")



Nominal length: 5mm - 14.5mm
(.02" - .450")



Nominal length: 15mm - 500mm
(.500" - 20")



Individual Inch Square Gauge Blocks

SPECIFICATIONS

Inch Blocks

* 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.

| Length (inch) | Order No.* | | Length (inch) | Order No.* | | Length (inch) | Order No.* | |
|----------------|------------|--------|----------------|------------|--------|---------------|------------|--------|
| | Steel | CERA | | Steel | CERA | | Steel | CERA |
| .01 | 614310 | — | .106 | 614146 | 616146 | .25 | 614212 | 616212 |
| .02005 | 614240 | — | .107 | 614147 | 616147 | .3 | 614193 | 616193 |
| .0201 | 614231 | — | .108 | 614148 | 616148 | .35 | 614213 | 616213 |
| .0202 | 614232 | — | .109 | 614149 | 616149 | .375 (3/8) | 614309 | — |
| .0203 | 614233 | — | .109375 (7/64) | 614306 | — | .4 | 614194 | 616194 |
| .0204 | 614234 | — | .11 | 614150 | 616150 | .45 | 614214 | 616214 |
| .0205 | 614235 | — | .111 | 614151 | 616151 | .5 | 614195 | 616195 |
| .0206 | 614236 | — | .112 | 614152 | 616152 | .55 | 614215 | 616215 |
| .0207 | 614237 | — | .113 | 614153 | 616153 | .6 | 614196 | 616196 |
| .0208 | 614238 | — | .114 | 614154 | 616154 | .65 | 614216 | 616216 |
| .0209 | 614239 | — | .115 | 614155 | 616155 | .7 | 614197 | 616197 |
| .02 | 614320 | — | .116 | 614156 | 616156 | .75 | 614217 | 616217 |
| .021 | 614321 | — | .117 | 614157 | 616157 | .8 | 614198 | 616198 |
| .022 | 614322 | — | .118 | 614158 | 616158 | .85 | 614218 | 616218 |
| .023 | 614323 | — | .119 | 614159 | 616159 | .9 | 614199 | 616199 |
| .024 | 614324 | — | .12 | 614160 | 616160 | .95 | 614219 | 616219 |
| .025 | 614325 | — | .121 | 614161 | 616161 | 1 | 614201 | 616201 |
| .026 | 614326 | — | .122 | 614162 | 616162 | 2 | 614202 | 616202 |
| .027 | 614327 | — | .123 | 614163 | 616163 | 3 | 614203 | 616203 |
| .028 | 614328 | — | .124 | 614164 | 616164 | 4 | 614204 | 616204 |
| .029 | 614329 | — | .125 | 614165 | 616165 | 5 | 614205 | — |
| .03 | 614330 | — | .126 | 614166 | 616166 | 6 | 614206 | — |
| .03125 (1/32) | 614301 | — | .127 | 614167 | 616167 | 7 | 614207 | — |
| .04 | 614340 | — | .128 | 614168 | 616168 | 8 | 614208 | — |
| .046875 (3/64) | 614302 | — | .129 | 614169 | 616169 | 10 | 614222 | — |
| .05 | 614105 | 616105 | .13 | 614170 | 616170 | 12 | 614223 | — |
| .06 | 614106 | — | .131 | 614171 | 616171 | 16 | 614224 | — |
| .0625 | 614303 | 616303 | .132 | 614172 | 616172 | 20 | 614225 | — |
| .07 | 614107 | — | .133 | 614173 | 616173 | | | |
| .078125 (5/64) | 614304 | — | .134 | 614174 | 616174 | | | |
| .08 | 614108 | — | .135 | 614175 | 616175 | | | |
| .09 | 614109 | — | .136 | 614176 | 616176 | | | |
| .09375 (3/32) | 614305 | — | .137 | 614177 | 616177 | | | |
| .1 | 614191 | 616191 | .138 | 614178 | 616178 | | | |
| .100025 | 614307 | — | .139 | 614179 | 616179 | | | |
| .10005 | 614135 | 616135 | .14 | 614180 | 616180 | | | |
| .100075 | 614308 | — | .141 | 614181 | 616181 | | | |
| .1001 | 614121 | 616121 | .142 | 614182 | 616182 | | | |
| .1002 | 614122 | 616122 | .143 | 614183 | 616183 | | | |
| .1003 | 614123 | 616123 | .144 | 614184 | 616184 | | | |
| .1004 | 614124 | 616124 | .145 | 614185 | 616185 | | | |
| .1005 | 614125 | 616125 | .146 | 614186 | 616186 | | | |
| .1006 | 614126 | 616126 | .147 | 614187 | 616187 | | | |
| .1007 | 614127 | 616127 | .148 | 614188 | 616188 | | | |
| .1008 | 614128 | 616128 | .149 | 614189 | 616189 | | | |
| .1009 | 614129 | 616129 | .15 | 614115 | 616115 | | | |
| .101 | 614141 | 616141 | .16 | 614116 | 616116 | | | |
| .102 | 614142 | 616142 | .17 | 614117 | 616117 | | | |
| .103 | 614143 | 616143 | .18 | 614118 | 616118 | | | |
| .104 | 614144 | 616144 | .19 | 614119 | 616119 | | | |
| .105 | 614145 | 616145 | .2 | 614192 | 616192 | | | |

Inch Wear Blocks

| Length (inch) | Order No.* |
|---------------|------------------|
| | Tungsten carbide |
| .05 | 615105 |
| .1 | 615191 |

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



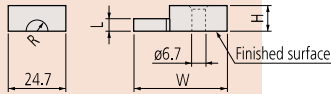
SPECIFICATIONS

| Metric | | | Inch | | |
|-------------------|--------------------|-------------------|-------------------|--------------------|-------------------|
| Order No. 516-611 | Included in set | Quantity Supplied | Order No. 516-612 | Included in set | Quantity Supplied |
| 619070 | Half round jaw | 2 pcs. | 619050 | Half round jaw | 2 pcs. |
| 619071 | Half round jaw | | 619051 | Half round jaw | |
| 619072 | Plain jaw | 1 pc. | 619052 | Plain jaw | 1 pc. |
| 619073 | Center point | | 619053 | Center point | |
| 619054 | Scriber point | 2 pcs. | 619054 | Scriber point | 2 pcs. |
| 619074 | Base | | 619055 | Base | |
| 619057 | Flat head screw | 2 pcs. | 619057 | Flat head screw | 2 pcs. |
| 619058 | Flat head screw | | 619058 | Flat head screw | |
| 619059 | Slotted head nut | 1 pc. | 619059 | Slotted head nut | 1 pc. |
| 619060 | Adjustable tie rod | | 619060 | Adjustable tie rod | |
| 619061 | Adjustable tie rod | 2 pcs. | 619061 | Adjustable tie rod | 2 pcs. |
| 619062 | Tie rod | | 619062 | Tie rod | |
| 619063 | Tie rod | 1 pc. | 619063 | Tie rod | 1 pc. |
| 619064 | Tie rod | | 619064 | Tie rod | |
| 619065 | Tie rod | 2 pcs. | 619065 | Tie rod | 2 pcs. |
| 619056 | Stud | | 619056 | Stud | |
| 619066 | Knurled head screw | | 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.

E

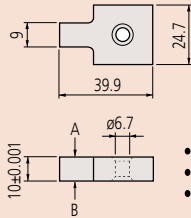
Half round jaw



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

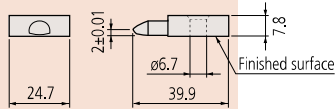
- Flatness tolerance 0.5μm
- Parallelism tolerance of L 0.5μm
- Tolerance of L ±0.5μm

Plain jaw 619072



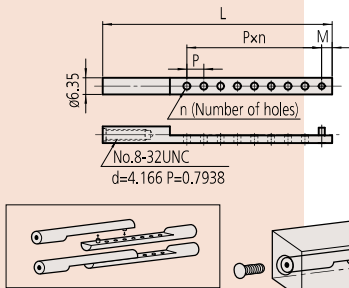
- Flatness tolerance 0.12μm
- Parallelism tolerance 0.12μm
- A and B are finished surfaces

Center point 619073



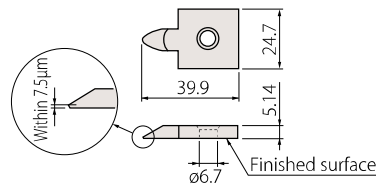
- Flatness tolerance 0.5μm

Adjustable tie rod

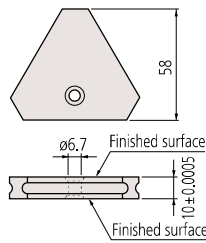


| Order No. | L | M | P | n |
|-----------|---------|--------|--------|----|
| 619060 | 124.5mm | 3.85mm | 6.35mm | 14 |
| 619061 | 86.5mm | 3.95mm | 6.35mm | 8 |

Scriber point 619054

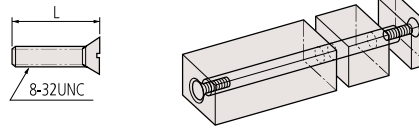


Base 619074



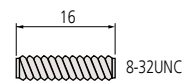
- Parallelism tolerance 1.5μm
- Flatness tolerance 1.5μm (The surface within 1.5mm of edge is excluded)

Flat head screw

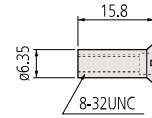


| Order No. | L |
|-----------|--------|
| 619057 | 31.6mm |
| 619058 | 15.8mm |

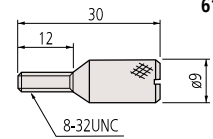
Stud 619056



Slotted head nut 619059



Knurled head screw 619066

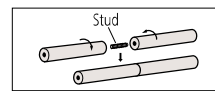
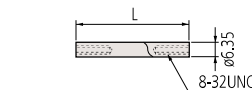


•Contraction caused by the clamping force

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 |

Tie rod



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

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 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 619056 | Stud | | | | | 1 | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 2 |
| 619065 | | | | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 619064 | Tie rod | | | | | | 1 | 1 | | 1 | | | | | | | | 1 | | | | | | | | | | | | |
| 619063 | | | | | | | | | 1 | | 1 | | | | | | | | | | | | | | | | | | | |
| 619062 | | | | | | | | | | | | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | |
| 619061 | Adjustable tie rod | | | | | | | | | | | | | | | | | | | | 2 | | 2 | | 2 | | | | 2 | 2 |
| 619060 | | | | | | | | | | | | | | | | | | | | | | 2 | | 2 | | 2 | | 2 | 2 | 2 |

Gauge Blocks

Length Standards Brought to You by Mitutoyo



An inspection certificate is supplied as standard. Refer to page X for details.

Step Master SERIES 516

- 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 $\pm 0.20\mu\text{m}$.
- 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 |

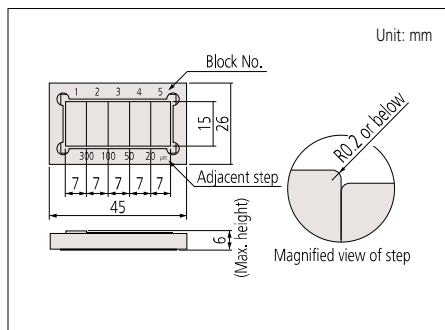
Ceramic type

| 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

E

DIMENSIONS



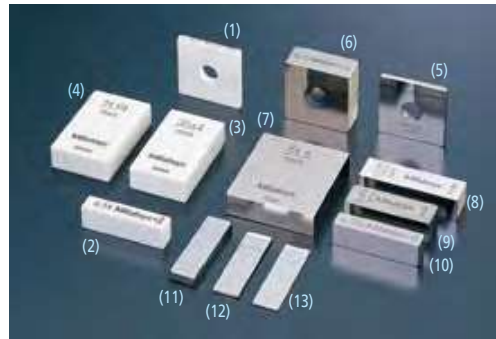


Custom-made Blocks & Gages

- 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 ultra-low expansion ceramic types are also available.
- 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.

Note: Please specify that coupling holes are to be supplied if they are required in your long custom-made gauge blocks. These holes are always supplied with standard gauge blocks over 100mm but not for custom-made Gauge Blocks unless specified.

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

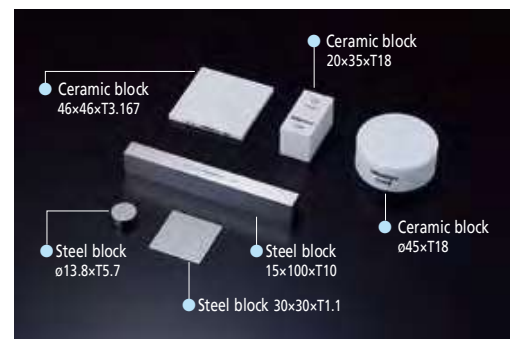
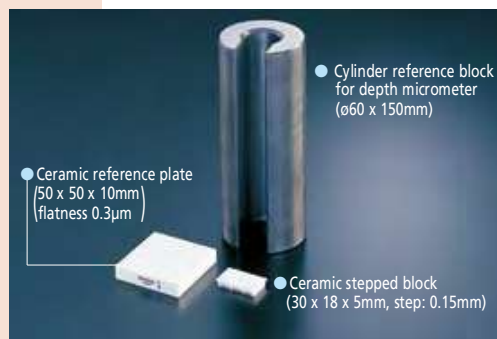


Ceramic

- (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)



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, etc.



516-650

*Order No. 516-650E; 516-650

Tools and accessories included:

1. Anti-corrosion oil (**600001**)
(100ml, spray can)
Used for both steel and tungsten-carbide gauge blocks.
2. Ceraston (**601645**)
(both sides finished by lapping)
3. Optical flat (**158-117**)
($\phi 45$, 12mm thickness, JIS Grade 3)
Used to check the wringing of thin gauge blocks and for the presence of burrs.
4. Tweezers (**600004**)
Used for handling thin gauge blocks.
5. Blower brush (**600005**)
Used for blowing dust from measuring surfaces.
6. Cleaning paper (**600006**)
(lens paper, 82 x 304mm, 500 pcs)
Used for wiping off rust preventive oil and contamination. Lint free.
7. Artificial leather mat (B4 size) (**600007**)
Used as a gauge block mat in order to avoid scratches on the work table
8. Reagent bottle (**600008**)
(polyethylene container, 100ml)
Bottle of wiping solution.
(Mitutoyo employs n-Heptane for solvent.)
9. Gloves (**600009**)
Used for handling large gauge blocks. Effective for the prevention of corrosion and thermal expansion.

* **516-650E**: Excluding anti-corrosive oil (**600001**)
516-650: including anti-corrosive oil (**600001**) is for domestic sales only.
In the case of an order from overseas, place an order for **516-650E**: excluding anti-corrosive oil, and order anti-corrosive oil (**600001**) separately.



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 gauge blocks are used. The most economical cycle for any particular set of gauge blocks is best determined by studying the calibration history. The list below indicates timings for a typical initial calibration cycle for the various grades of block.

| Application | Cycle | Grade (reference) |
|-------------|---------|-------------------|
| Reference | 1 - 2 | K |
| Standard | 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



- 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) x50 (D) x20 (H) mm



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

Removing burrs

Figure 1

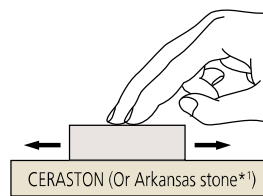
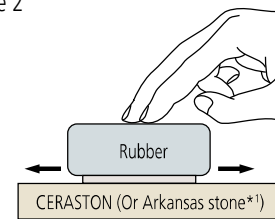


Figure 2



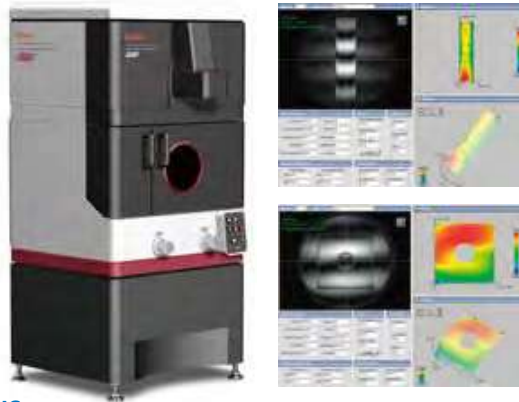
- (1) Wipe any dust and oil films from the gauge block and the Ceraston (or Arkansas stone) using a solvent.
- (2) Place the gauge block on the Ceraston so that the measuring face that has burrs is on the abrasive surface of the stone. While applying light pressure, move the gauge block to and fro about 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.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Automatic Gauge Block Interferometer GBI (Interference fringe analyzing processing)



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 |
| 0.1mm - 250mm | $0.025\mu\text{m} + 0.2 \times 10^{-6} L$ L = Gauge block length (mm) | 12 | 632.8nm frequency-stabilized He-Ne laser 543.5nm frequency-stabilized He-Ne laser | 20±0.5°C Under mild temperature change without direct exposure to cold or warm air |



An inspection certificate is supplied as standard. Refer to page X for details.

- Automatic primary-level measuring instrument for gauge block lengths between 0.1mm and 250mm using optical interference. GBI is a Twyman-Green interferometer which employs the method of multiple wavelength coincidence to calibrate lengths more accurately.
- 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 sources are highly stable. This allows 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.

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



An inspection certificate is supplied as standard. Refer to page X for details.

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

SPECIFICATIONS

| Metric | | | | | |
|-------------------|--------------------|---|--|-----------------|---|
| Range | Resolution | Accuracy in narrow range (20°C) | Upper gage head | | |
| | | | Type | Measuring force | Contact point |
| 0.5mm - 100mm | 0.00001mm (0.01μm) | $\pm(0.03 + 0.3L/1000)\mu\text{m}^*$ L = Gauge block length (mm) | Mu-Checker | 1N (100gf) | Carbide contact point of radius of 20mm |
| Lower gaging head | | | Operating conditions | | |
| Type | Measuring force | Contact point | Temperature: 20°C ±1°C Humidity: 58%RH ±15%RH | | |
| Mu-Checker | 0.6N (60gf) | Carbide contact point of radius 5mm | | | |

* Uncertainty of measurement at the 95% confidence level (not including the calibration error of the reference gauge block).
Note: To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V



516-145-E2



An inspection certificate is supplied as standard. Refer to page X for details.

- Measuring capability: Rectangular Gauge Blocks; Square Gauge Blocks (requires dedicated holder - optional accessory)
- Measuring method: Differential measurement between upper and lower gaging heads (dual head system)

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



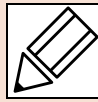
SPECIFICATIONS

| 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: ±3mm | | | |
| 0.1mm - 250mm | 0.00001mm (0.01µm) | $\pm(0.03+0.3L/1000)\mu\text{m}^*$ L = Gauge block length (mm) | $\pm(0.03+0.3L/1000)\mu\text{m}^*$ L = Gauge block length (mm) | | | |
| Upper gage head | | Lower gaging head | | | Operating conditions | |
| Type | Measuring force | Contact point | Type | Measuring force | | Contact point |
| Laser Hologage | 0.7N | Carbide contact point of radius 20mm | Laser Hologage | 0.2N | Carbide contact point of radius 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).
Note: To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V

E

Quick Guide to Precision Measuring Instruments



Gauge Blocks

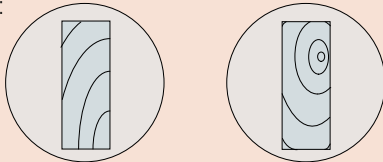
■ Definition of the Meter

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

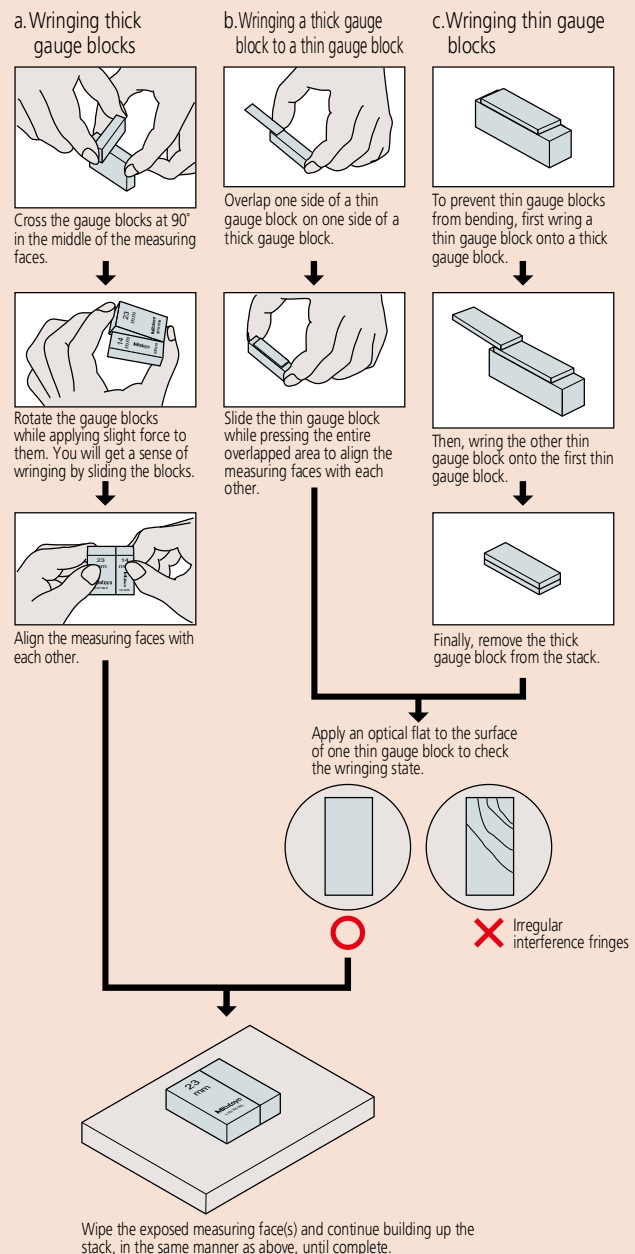
Select gauge blocks to be combined to make up the size required for the stack.

- (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.
 - 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.
 - d. Lightly press the optical flat to check that the interference fringes disappear.
 - 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, fine-grained abrasive stone.
- (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:



■ Thermal Stabilization Time

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

