



**SEIMITSU**<sup>®</sup>

— PRECISION IN EVERY MEASUREMENT —

PRODUCT CATALOGUE

PRECISION

STABILITY

RELIABILITY

# PRECISION GAUGE BLOCKS

Steel • Tungsten Carbide • Zirconia Ceramic



— ACCURACY • STABILITY • RELIABILITY —

# Gauge Blocks: Materials, Grades & Maintenance

## Choosing the Right Material

### Steel Gauge Blocks



Steel gauge blocks are widely used because their thermal expansion closely matches that of most steel components, helping reduce temperature-related measurement differences. With proper handling and regular maintenance, they are suitable for everyday use.

### Tungsten Carbide Gauge Blocks

Tungsten carbide gauge blocks are well suited to intensive use because of their exceptional wear resistance. Seimitsu cites a study indicating 10 times the wear resistance of steel, making them an economical option for demanding applications.



## Ceramic Gauge Blocks

Ceramic gauge blocks resist wear and scratching, helping preserve the wringing quality of their measuring faces. Their corrosion-resistant construction withstands perspiration from handling and normal wear and tear.

## Selecting the Appropriate Grade

### **Grade K – Reference Standards**

Master blocks used by calibration laboratories to calibrate other gauge blocks.

### **Grade 0 – Laboratory Standards:**

Used for calibrating gauges and measuring instruments.

### **Grade 1 – Working Standards:**

for daily verification and calibration of gauges and measuring instruments in inspection rooms.

### **Grade 2 – Production Standards:**

Working standards used for inspection and setting tasks on production shop floors.



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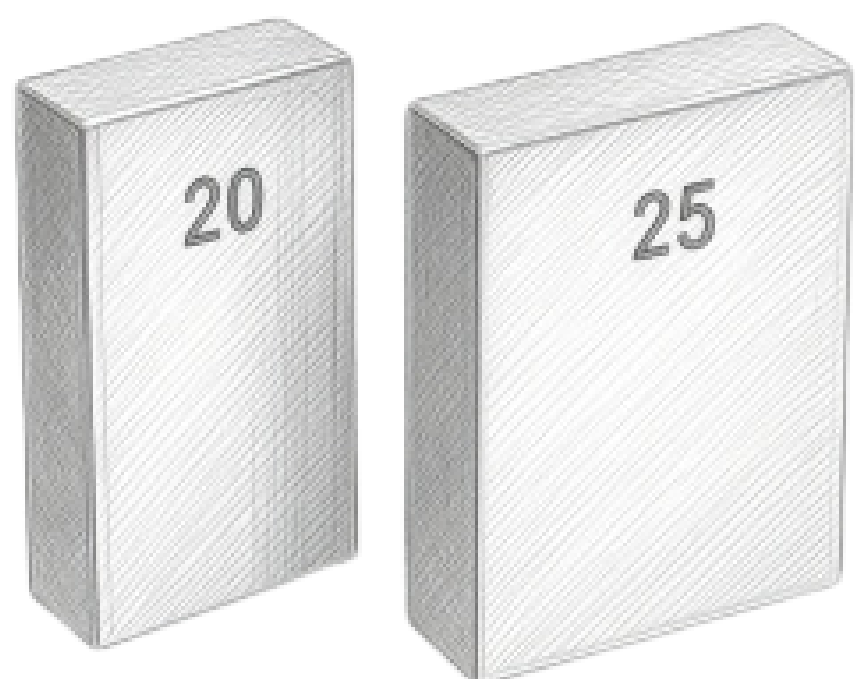
# High-Precision Alloy Steel Gauge Blocks

High-precision alloy steel gauge blocks deliver accurate, cost-effective industrial length measurement. Their thermal expansion closely matches conventional steel workpieces, minimizing temperature-related measurement errors.

Precision-ground under strict controls, they offer excellent wringability for stable stacks.

## Product Overview

SEIMITSU makes steel—or alloy steel—gauge blocks from premium high-carbon chromium bearing steel, such as GCr15, providing essential manufacturing length standards.



Unique multi-stage artificial aging and deep cryogenic treatment counter environmental sensitivity, stabilize the microstructure and minimize long-term dimensional drift.



## Optimized Thermal Matching

A coefficient of  $(11.5 \pm 1.0) \times 10^{-6} \text{ K}^{-1}$  closely matches most engineering components. Synchronized block/workpiece expansion and contraction partly offset temperature errors in variable-temperature comparisons, delivering realistic, reliable results.



## Advanced Heat Treatment & Ageing

Vacuum quenching and cyclic aging ensure stable 60–65 HRC hardness, eliminate residual stresses, and preserve geometric stability and dimensional accuracy through frequent use or prolonged storage.



## Mirror-Finish Wringability

Ultra-fine polishing and lapping produce measuring faces with extremely low surface roughness. When wrung, the blocks form strong, uniform molecular adhesion with a tightly controlled film thickness, minimizing cumulative tolerance in multi-block stacks.

# APPLICATIONS



*Comes With Manufacturer Instruction Certificate*

## Routine Instrument Calibration

Calibrate micrometers, calipers and digital indicators regularly to maintain consistent measurements across factory instruments.

## Precision Dimensional Comparison

Enable quality control teams to perform highly accurate comparative checks of component length, thickness and spacing.

# CNC Setup and Referencing

Serve as reference standards for tool setting and defining workpiece coordinate systems in precision machining.

# Teaching and Laboratory Use

Demonstrate length traceability principles in mechanical engineering and metrology courses.

# Set Available

| Block set                                                      | Detailed dimensions (mm)               | Grade     |
|----------------------------------------------------------------|----------------------------------------|-----------|
| 83 pieces,<br><br>DIN EN ISO 3650<br>ASME B89.1.9<br>GB/T 6093 | 0.5 , 1 block                          | K,0,1 & 2 |
|                                                                | 1.005, 1 block                         |           |
|                                                                | 1-1.49, total 50 blocks                |           |
|                                                                | 1.5–1.9, interval 0.1, total 5 blocks  |           |
|                                                                | 2.0–9.5, interval 0.5, total 16 blocks |           |
|                                                                | 10–100, interval 10, total 10 blocks   |           |

| Block set                   | Detailed dimensions (mm)                                     | Grade     |
|-----------------------------|--------------------------------------------------------------|-----------|
| 87 pieces,<br>ISO standard  | 1.001–1.009, in increments of 0.001,<br>9 values in total    | K,0,1 & 2 |
|                             | 1.01–1.49, in increments of 0.01,<br>49 values in total      |           |
|                             | 0.5–9.5, in increments of 0.5,<br>19 values in total         |           |
|                             | 10–100, in increments of 10,<br>10 values in total           |           |
| 112 pieces,<br>ISO standard | 1.0005                                                       | K,0,1 & 2 |
|                             | 1.001–1.009, in increments of 0.001,<br>9 intervals in total |           |
|                             | 1.01–1.49, in increments of 0.01, 49<br>intervals in total   |           |
|                             | 0.5–24.5, in increments of 0.5, 49<br>intervals in total     |           |
|                             | 25–100, in increments of 25, 4<br>intervals in total         |           |

## **FAQ about Steel Gauges**

### **Why are steel blocks preferred over ceramic in production?**

Their thermal expansion closely matches steel workpieces, helping reduce measurement errors when temperatures differ from 20°C. Combined with lower costs, this makes them a practical choice for high-volume workshops.

### **How can steel gauge blocks be protected from rust?**

Steel remains sensitive to humidity and acidic hand sweat, even after hardening. Handle blocks with gloves or dedicated tweezers. After use, clean with a lint-free cloth and apply a thin layer of anti-rust oil.

### **Which accuracy grade should I choose?**

Grade 0 provides higher precision for top-level factory references and instrument calibration. Grade 1 suits precision component inspection in tool rooms or calibration laboratories, while Grade 2 generally meets routine workshop machining requirements.

### **Can dropped or scratched blocks be reused?**

Scratches may create edge burrs that impair wringing and accuracy. Carefully remove burrs with a dedicated Arkansas oilstone, then check wringing performance or arrange recalibration at a metrology laboratory before reuse.



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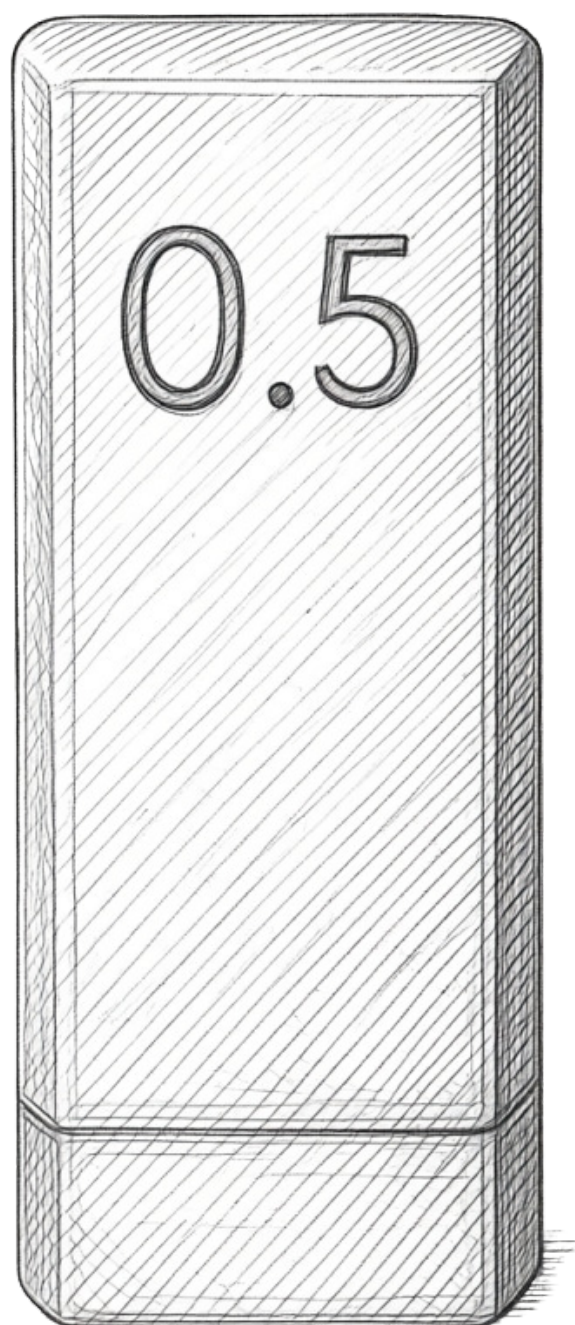
# High-Precision Zirconia Ceramic Gauge Blocks

Designed for high-precision length measurement, ceramic gauge blocks—also called ceramic gauges—are made from zirconia ( $\text{ZrO}_2$ ), an ultra-hard material. Each block has a rectangular cross-section with two parallel measuring faces.

Molecular force allows these faces to adhere to the measuring surfaces of another gauge block or an object with similar surfaces.



## Product Overview



SEIMITSU'S Ceramic Gauge Blocks are engineered for demanding dimensional metrology applications. They address the limitations of conventional steel gauges by resisting corrosion caused by skin acids and humidity.

Thus making them suitable for high-precision laboratories and challenging shop-floor environments.



## **Exceptional Wear Resistance (Hardness: 1350 HV)**

Our zirconia ceramic is considerably harder than steel and tungsten carbide. Its high wear resistance minimizes scratches and burrs that may compromise measurement accuracy, helping to extend calibration intervals and reduce the overall cost of ownership.



## **Non-Magnetic Properties & Thermal Compatibility**

The fully non-magnetic ceramic construction prevents magnetic attraction of metal chips and dust. Its thermal expansion coefficient of  $(9.5-10) \times 10^{-6}/^{\circ}\text{C}$  closely matches that of steel, allowing easy integration into established engineering processes.



## **Outstanding Wringing Capability**

Our advanced, proprietary lapping process produces measuring surfaces with flatness exceeding international standards. These finely finished faces adhere securely through molecular attraction, forming a firm, stable gauge-block stack for the most demanding precision measurements.

# STANDARDS



Product Labelling is laser-engraved onto the surface

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| Nominal Length              | Cross-Section |
|-----------------------------|---------------|
| 0.5–10 mm (inclusive)       | 30 × 9 mm     |
| Over 10 mm and up to 150 mm | 35 × 9 mm     |

## Available Classifications

- Measurement Units: Metric (mm)
- Packaging Options: Individual blocks and sets.
- Accuracy Grades: Metric—K,0,1 and 2
- Size Options: Standard and non-standard dimensions.

# Set Available

| Block set                                                      | Detailed dimensions (mm)                                  | Grade     |
|----------------------------------------------------------------|-----------------------------------------------------------|-----------|
| 83 pieces,<br><br>DIN EN ISO 3650<br>ASME B89.1.9<br>GB/T 6093 | 0.5 , 1 block                                             | K,0,1 & 2 |
|                                                                | 1.005, 1 block                                            |           |
|                                                                | 1-1.49, total 50 blocks                                   |           |
|                                                                | 1.5–1.9, interval 0.1, total 5 blocks                     |           |
|                                                                | 2.0–9.5, interval 0.5, total 16 blocks                    |           |
|                                                                | 10–100, interval 10, total 10 blocks                      |           |
| 87 pieces,<br>ISO standard                                     | 1.001–1.009, in increments of 0.001,<br>9 values in total | K,0,1 & 2 |
|                                                                | 1.01–1.49, in increments of 0.01,<br>49 values in total   |           |
|                                                                | 0.5–9.5, in increments of 0.5,<br>19 values in total      |           |
|                                                                | 10–100, in increments of 10,<br>10 values in total        |           |

| Block set                   | Detailed dimensions (mm)                                     | Grade     |
|-----------------------------|--------------------------------------------------------------|-----------|
| 112 pieces,<br>ISO standard | 1.0005                                                       | K,0,1 & 2 |
|                             | 1.001–1.009, in increments of 0.001,<br>9 intervals in total |           |
|                             | 1.01–1.49, in increments of 0.01, 49<br>intervals in total   |           |
|                             | 0.5–24.5, in increments of 0.5, 49<br>intervals in total     |           |
|                             | 25–100, in increments of 25, 4<br>intervals in total         |           |

# Key Features

## Extended Service Life

High hardness and wear resistance provide a service life 5–10 times longer than steel blocks and 4–5 times longer than carbide blocks. It currently offers the longest service life and calibration intervals among materials used in measuring instruments.



## Excellent Corrosion Resistance

Resistant to common chemical reagents, the blocks can be handled with bare hands without anti-rust treatment. They require no special treatment during use or long-term storage.

## High Stability

Minimal annual variation ensures excellent dimensional stability and allows calibration intervals to be appropriately extended.

## Superior Surface Finish

Made from fine-grade material and super-finely ground, the blocks offer smooth surfaces, high lapping force and superior lapping accuracy.

## Steel-Compatible Thermal Expansion

A linear expansion coefficient similar to commonly used steel allows these blocks to replace metal blocks. No temperature correction is required when measuring steel products.

## Non-Magnetic and Non-Conductive

These properties make the blocks suitable for specialized applications.

(optional)

**Calibration  
Certificate By NABL  
As Per ISO/IEC 17025**



**NABL**

## **FAQ about Ceramic Gauges**

### **Why are ceramic blocks better than steel for daily use?**

Rust-proof ceramic blocks require no oiling before or after use, making handling cleaner and more efficient. If dropped, they may chip or remain flat rather than develop burrs that affect measurement accuracy.

### **Can I mix ceramic blocks with steel blocks in one stack?**

Yes, they can be wrung together. However, an all-ceramic stack is recommended for consistent thermal expansion and to prevent potential scratching of steel surfaces by harder ceramic blocks.

### **Is the thermal expansion of ceramic different from steel?**

Ceramic's coefficient is slightly lower:  $9.5 \times 10^{-6}/^{\circ}\text{C}$  versus  $11.5 \times 10^{-6}/^{\circ}\text{C}$  for steel. The difference is generally negligible in workshops, but ultra-high-precision laboratory measurements require temperature compensation.

### **Do these come with a calibration certificate?**

Every Meter Precision gauge block includes a factory inspection report. You can also opt for NABL Certificate which is completely optional.

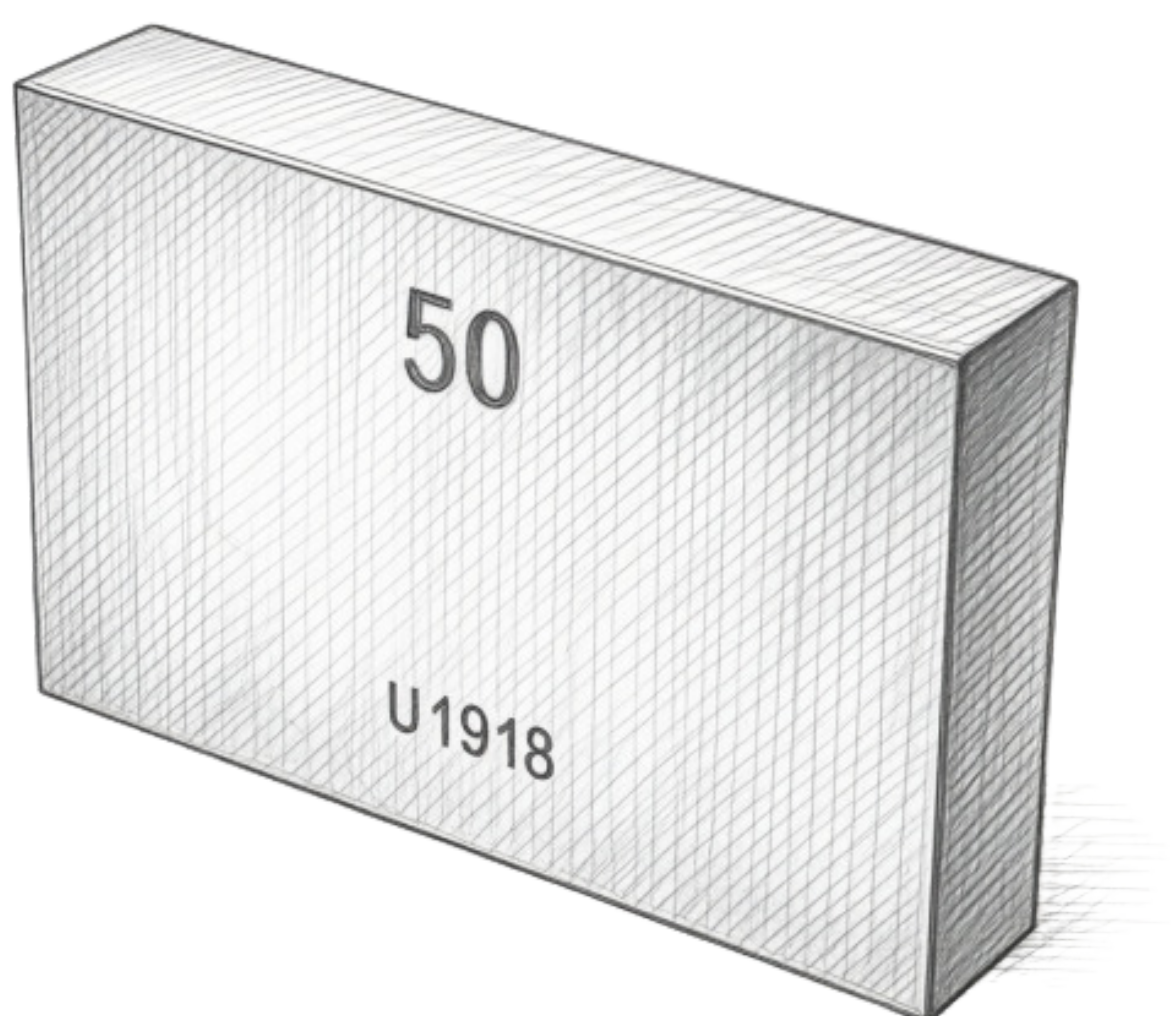


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# High-Precision Tungsten Carbide Gauge Blocks

These gauge blocks deliver exceptional longevity with 50–100 times the wear resistance of standard steel, significantly extending calibration intervals.

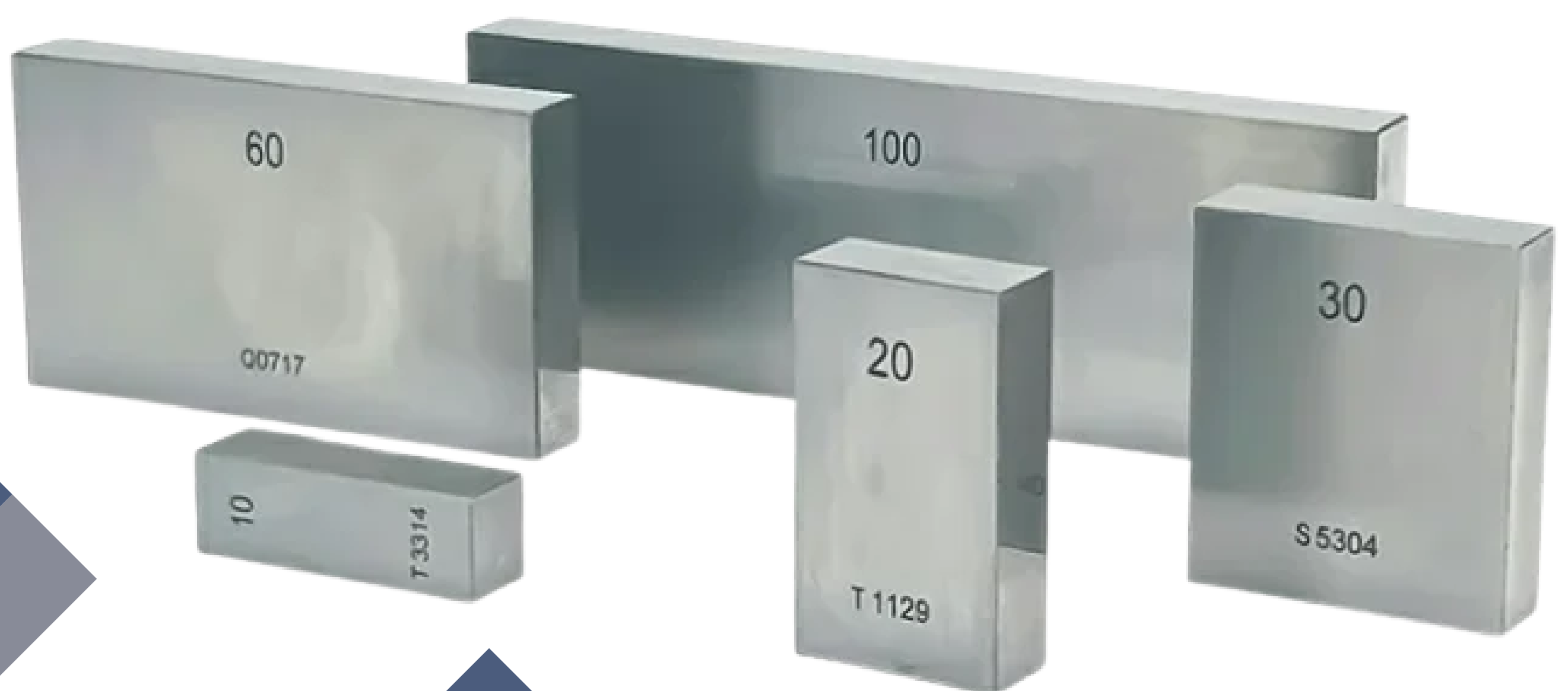
Their high modulus of elasticity provides superior rigidity, minimal deformation under pressure and excellent dimensional stability. Multiple precision-lapping stages deliver extremely low surface roughness and excellent wringability.



## Product Overview

Tungsten carbide gauge blocks, also known as cemented carbide gauge blocks, are industrial measurement standards engineered for extreme wear resistance.

- **Made from ultra-fine-grain tungsten carbide with hardness of 1500 HV or above—far exceeding conventional tool steels—they resist scratches and wear during intensive, frequent workpiece contact, maintaining long-term measurement consistency.**
- **Mirror-lapped surfaces enable effortless wringing with minimal cumulative error in stacked combinations. Thus, making them a premier choice for high-frequency workshop use and master gauge setting.**
- **Rigorously inspected in a 20°C constant-temperature laboratory, these blocks provide reliable measurement references for aerospace, automotive manufacturing and precision machining.**





## Hardness & Wear Protection

Over twice as hard and several dozen times more wear-resistant than standard steel, tungsten carbide wear blocks protect internal blocks at both stack ends, significantly reducing long-term replacement costs.



## Rigidity & Stability

High elastic modulus and compressive strength minimize deformation. Specialized heat treatment and aging eliminate residual stresses, maintaining nanometre-level dimensional stability for years.



## Precision Wringability

Independently developed polishing and lapping create mirror-flat measuring faces, enabling strong molecular adhesion, near-gap-free wringing and minimal cumulative stacking error.

# APPLICATIONS



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## Precision Machining

Provides the highest-level reference standard for positioning CNC machining centres and grinding machines.

## Instrument Calibration

Supports routine calibration of micrometers, calipers, digital height gauges and other general measuring instruments.

# Automotive Inspection

Enables on-site monitoring and frequent, high-volume inspection of engine components, transmission systems and other automotive parts.

# Wear Protection

Forms protective layers in complex gauge-block combinations, preventing wear on precision steel or ceramic blocks.

# Set Available

| Block set                                                      | Detailed dimensions (mm)               | Grade     |
|----------------------------------------------------------------|----------------------------------------|-----------|
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|                             | 25–100, in increments of 25, 4<br>intervals in total         |           |

## **FAQ about Tungsten Gauges**

### **What advantages does tungsten carbide offer over ceramic?**

Both materials are extremely hard, but tungsten carbide offers greater toughness and impact resistance than brittle ceramic, reducing workshop chipping. Its high density also provides a more stable, tactile wringing feel.

### **Does thermal expansion affect measurement accuracy?**

Yes. Tungsten carbide's coefficient is approximately  $4.2 \times 10^{-6}/^{\circ}\text{C}$ , compared with  $11.5 \times 10^{-6}/^{\circ}\text{C}$  for steel. Measuring steel outside  $20^{\circ}\text{C}$  requires temperature compensation, making carbide particularly suitable as a high-precision reference in controlled laboratories.

### **Can tungsten carbide rust, and how should it be maintained?**

Despite excellent corrosion resistance, rust spots may develop in humid or corrosive conditions. After use, remove fingerprints and moisture with a lint-free cloth, apply a little acid-free anti-rust oil and store in a dry protective case.



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**FOR MORE INFORMATION PLEASE CONTACT:**



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