Test Block
Application Guide

A complete line of Hardness Test Blocks and Accessories
Hardness testing provides critical information and insight into a material’s durability, strength, flexibility and capabilities. It is a commonly used test method in many industries to verify heat treatment, structural integrity and quality of components. Hardness testing ensures the materials utilized in components we use every day contribute to a well engineered, efficient and safe world.

Ensure Accurate Hardness Results

Calibrated test blocks are an integral part of hardness testing. They ensure accuracy, integrity and traceability of hardness testing processes. They are used to verify instruments performance and provide a means for performing indirect instrument calibrations.

Trusted in the Industry

Buehler’s Wilson test blocks are trusted by leading companies in industry, especially those in the following industries:

- Aerospace
- Automotive
- Medical
- Primary Metals
Buehler Leads the Way in Hardness Testing.

Buehler, with its Wilson line of hardness testers, is the global leader in hardness testing software, equipment and accessories. Buehler is proud to be the proprietor of 100-year old legacy brands including Wilson Instruments, Reicheter, and Wolpert, the innovators and founders of the hardness testing industry. Today, Buehler provides innovative solutions for hardness testers, DiaMet™ software and hardness test blocks.
What Sets BUEHLER Apart

Consistency of Results

Strict control over the raw materials and tight specifications for heat treating improve the homogeneity and consistency of Buehler’s test blocks. These controls ensure that customers can have confidence in the results achieved with Buehler’s test blocks.

Leaders in the Industry

Wilson originally developed the Rockwell testing process and standards. Today, Buehler is continuing to push the materials testing industry forward through active participation in ASTM and ISO committees. Buehler has been named an authorized calibrating agency for certain Master and Secondary standardized test blocks by ASTM.
Globally Recognized Accreditation

Buehler’s Test Block Calibration Laboratory is accredited to ISO / IEC 17025 by the American Association for Laboratory Accreditation (A2LA). A2LA participates in the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). The ILAC MRA creates a global network of testing and calibration laboratories that have been accredited to provide accurate and reliable results.

Advanced Production Capabilities

Extensive Product Offering

Buehler’s Test Block Calibration Laboratory has the capability to produce and calibrate test blocks for many different hardness scales.

- **Rockwell**: Regular and Superficial scales
- **Vickers Microindentation**: Loads from 10gf to 1kgf
- **Vickers Macroindentation**: Loads from 1kgf to 120kgf
- **Knoop Microindentation**: Loads from 10gf to 1kgf
- **Brinell**: HBW5/750, HBW5/250, HBW10/1000, HBW10/3000, HBW2.5/62.5, HBW2.5/187.5

Experts in Surface Preparation

Surface preparation is a critical aspect that affects the accuracy and consistency of a finished test block. Buehler’s expertise in sample preparation and high quality products have been applied to the in-house processing to continually produce test blocks with the highest quality surface finish.

Advanced Hardness Testing Machines

The Buehler Test Block Calibration Laboratory utilizes state of the art Buehler hardness testing systems for the calibration process. These advanced systems have been built to provide the tightest control and consistency in the calibration process.
Proper Use of Test Blocks

Useful Life of a Test Block

The useful life of a test block is determined by the density of indents on the surface. The density of indents is determined by the allowable indent spacing and varies by hardness test. Once recommended densities are reached, the test block must be replaced. Test blocks must be used on the top side only and are recommended to be replaced after five years.

In-House Verification Testing

In-house verification testing is a critical part of hardness testing performed by the user to ensure conformance with ASTM & ISO standards. The frequency is determined by the standard to which the lab is operating. Some common reasons for conducting a verification test are:

- Beginning production each day
- Changing indenters
- Changing test force

Third-Party Verification Testing

In addition to in-house daily verifications, standards also require indirect verifications to be completed periodically by a certified body. These verifications check that the performance of the machine meets specifications and must be done on all hardness scales and loads that the machine is used for.
Proper Indent Spacing

When making indentations on a test block, the hardness of the material immediately surrounding an indentation will usually increase due to the residual stress and work hardening caused by the indentation process. If an indentation is made too close to the edge of a test piece, there may be insufficient material to constrain the deformation around the indentation. Both of these scenarios can lead to inaccurate hardness readings. To prevent incorrect readings, recommended spacing has been defined in the standards for each type of hardness test. To ensure proper spacing is followed, Buehler offers pattern engraving on the surface of test blocks.

Rockwell & Brinell

According to ASTM and ISO Standards: The distance between the centers of two adjacent indentations shall be at least three times the diameter (d) of the indentation.

The distance from the center of any indentation to an edge of the test piece shall be at least two and a half times the diameter of the indentation.

Vickers

According to ASTM Standards: The distance between two indents or an indent and the edge of the test piece shall be at least two and a half times the diagonal (dV) of the indentation.

According to ISO Standards: The distance between the centers of two indents shall be at least three times the diagonal (dV) of the indent for steel, copper and copper alloys, and at least six times for light metals, lead and tin and their alloys. The distance between the center of an indent and the edge of the test piece shall be at least two and a half times the diagonal (dV) for steel, copper and copper alloys, and at least three times for light metals, lead and tin and their alloys.

Knoop

According to ASTM Standards: The distance between two indents shall be at least two times the diagonal (dK) of the indentation and two and a half times the width (dW) of the indentation. The distance between the center of an indentation and the edge of a test piece shall be at least one diagonal (dK) or two and a half times the width (dW) of the indentation.

According to ISO Standards: The distance between two indents shall be at least two times the diagonal (dK) of the indentation and three and a half times the width (dW) of the indentation. The distance between the center of an indentation and the edge of a test piece shall be at least one diagonal (dK) or three and a half times the width (dW) of the indentation.
Wilson® Rockwell Test Blocks

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Nominal Hardness</th>
</tr>
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<tbody>
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<td>9201110</td>
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<td>9201150</td>
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<td>83HRA</td>
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<td>40HRB</td>
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<tr>
<td>9202060W</td>
<td>50HRB</td>
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<tr>
<td>9202070W</td>
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<td>60HRC</td>
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<td>9206070W</td>
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*Certified using a Tungsten Carbide ball indenter*

### Superficial Rockwell

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<td>9212190</td>
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<td>9213110</td>
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<td>9213130</td>
<td>55HR30N</td>
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<td>9219090W</td>
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### Special Order Items

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>9201002</td>
<td>Special Range/Hardness Request</td>
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<tr>
<td>9201003</td>
<td>Engraving for Indent Spacing</td>
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<tr>
<td>9201006</td>
<td>API Compliance</td>
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The following item numbers are the most commonly requested test blocks. Buehler’s product offering and capabilities extend beyond these listed item numbers and the full product offering is listed on the Buehler website. Please contact us if you need assistance selecting an appropriate test block for your application.
## Wilson® Vickers-Knoop Test Blocks

### Vickers Test Blocks

According to ASTM E92 & ISO 6507

<table>
<thead>
<tr>
<th>Load (kg)</th>
<th>Part Number</th>
<th>Nominal Hardness</th>
<th>Range</th>
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<td>175-224</td>
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<td>93-001-775</td>
<td>775 HV</td>
<td>750-800</td>
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<td>HV0.1</td>
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<td>200 HV</td>
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<td>93-003-515</td>
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<td>490-540</td>
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<td>93-003-700</td>
<td>700 HV</td>
<td>675-725</td>
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<td>93-003-775</td>
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<td>HV0.2</td>
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<td>93-005-515</td>
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<td>93-010-830</td>
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### Knoop Test Blocks

According to ASTM E92 & ISO 4545

<table>
<thead>
<tr>
<th>Load (kg)</th>
<th>Part Number</th>
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<th>Range</th>
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<tbody>
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<td>HK0.5</td>
<td>94-005-225</td>
<td>225 HK</td>
<td>200-250</td>
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<td></td>
<td>94-005-315</td>
<td>315 HK</td>
<td>290-340</td>
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<td>94-005-440</td>
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<td>94-005-540</td>
<td>540 HK</td>
<td>515-565</td>
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<td>94-005-630</td>
<td>630 HK</td>
<td>605-655</td>
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<td>94-005-730</td>
<td>730 HK</td>
<td>705-755</td>
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<td>94-005-850</td>
<td>850 HK</td>
<td>825-875</td>
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### Special Order Items

<table>
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<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>93-000-001*</td>
<td>Vickers Microindentation (10gf - 500gf)</td>
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<tr>
<td>93-000-002*</td>
<td>Vickers Macroindentation (1kgf - 50kgf)</td>
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<td>94-000-001*</td>
<td>Knoop Microindentation (10gf - 500gf)</td>
</tr>
<tr>
<td>93-000-012</td>
<td>2 Vickers-Knoop Calibrations</td>
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<tr>
<td>93-000-013</td>
<td>3 Vickers-Knoop Calibrations</td>
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<td>93-000-014*</td>
<td>4 Vickers-Knoop Calibrations</td>
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*Specify hardness required and load force for calibration

• Specify additional load force for calibration
# TEST BLOCK ORDERING INFO

## Wilson® Brinell Test Blocks

### Brinell reference blocks up to 250kgf load

<table>
<thead>
<tr>
<th>Nominal value</th>
<th>min</th>
<th>max</th>
<th>HBW2.5/62.5 scale</th>
<th>HBW2.5/187.5 scale</th>
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</thead>
<tbody>
<tr>
<td>140 HBW</td>
<td>115</td>
<td>169</td>
<td>WH-140HBW-625</td>
<td>WH-140HBW-1875</td>
</tr>
<tr>
<td>200 HBW</td>
<td>170</td>
<td>224</td>
<td>WH-200HBW-625</td>
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<tr>
<td>250 HBW</td>
<td>225</td>
<td>274</td>
<td>WH-250HBW-625</td>
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<td>300 HBW</td>
<td>275</td>
<td>324</td>
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<td>350 HBW</td>
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<td>400 HBW</td>
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### Brinell reference blocks up to 3000kgf load

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<tr>
<th>Nominal value</th>
<th>min</th>
<th>max</th>
<th>HBW5/750 scale</th>
<th>HBW10/3000 scale</th>
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<tbody>
<tr>
<td>140 HBW</td>
<td>115</td>
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<td>200 HBW</td>
<td>170</td>
<td>224</td>
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<td>275 HBW</td>
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MORE HARDNESS TESTING PRODUCTS

Rockwell Calibration Kits

Buehler offers calibration kits for use when calibrating Rockwell hardness testers. These kits contain an indenter and three test blocks specifically chosen to cover the required hardness range. Calibration kits are currently available for the following scales:

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<th>HRA</th>
<th>HRE</th>
<th>HR30N</th>
</tr>
</thead>
<tbody>
<tr>
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<td>HRF</td>
<td>HR45N</td>
</tr>
<tr>
<td>HRC</td>
<td>HR15N</td>
<td>HR15T</td>
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<td></td>
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<td>HR45T</td>
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Visit the Rockwell Test Blocks webpage for more information.

Hardness Testing Machines

Buehler’s product offering includes a comprehensive range of Wilson hardness testers for Rockwell, Vickers, Knoop and Brinell testing. These testers are supported by DiaMet automation software to provide a complete testing solution. DiaMet software focuses on fast and simple operation to satisfy the needs of low trained operators while maintaining the flexibility and high level of features required by expert users.

Visit the Hardness Testing webpage on the Buehler website for more information.

Indenters

Buehler also offers a full range of indenters for Rockwell, Vickers, Knoop and Brinell hardness testing.

Please see the current Product Catalog or Buehler website for more information.

Global Service Teams

Buehler’s global service teams are committed to supporting our customers around the world. Our goal is to help our customers protect their investment, ensure consistent performance, minimize downtime and reduce the likelihood of costly repairs. To support our customers, we offer preventative maintenance plans, calibration & verification services, machine repair, spare parts and more.

Visit the Service webpage on the Buehler website for more information.