



Test Block Application Guide

A complete line of Hardness Test Blocks and Accessories



HARDNESS TESTING IS

CRITICAL

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



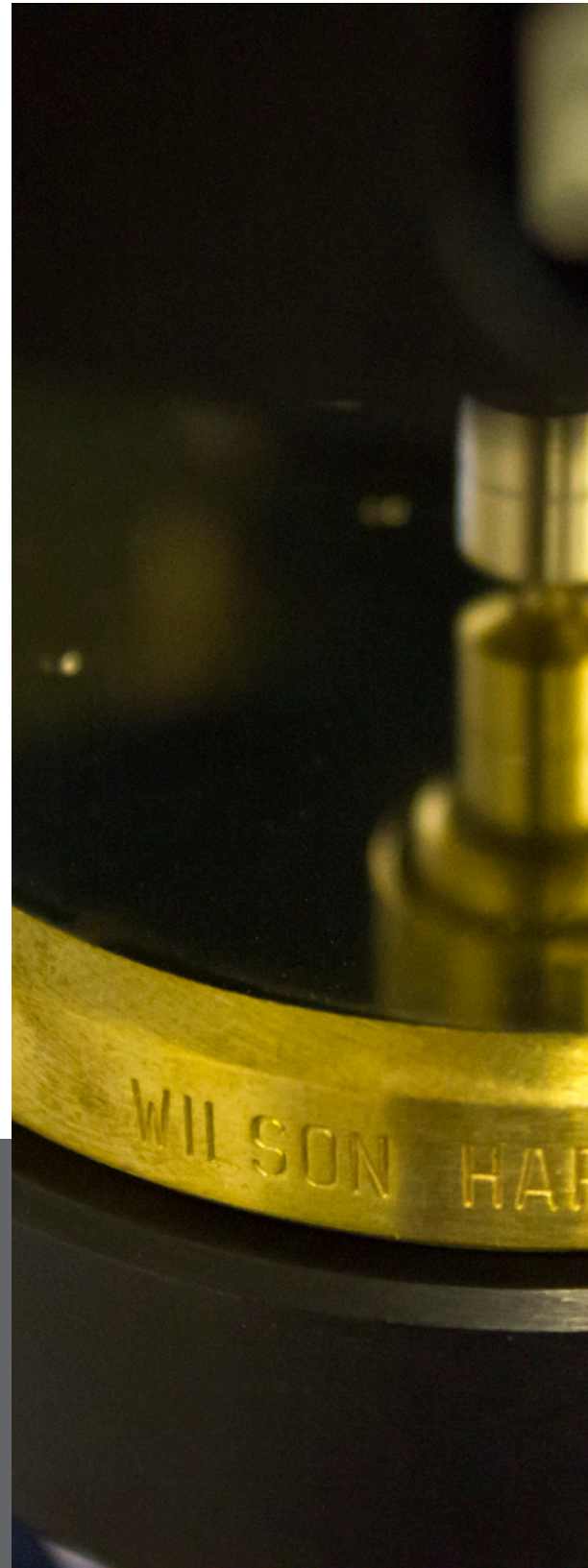
Automotive

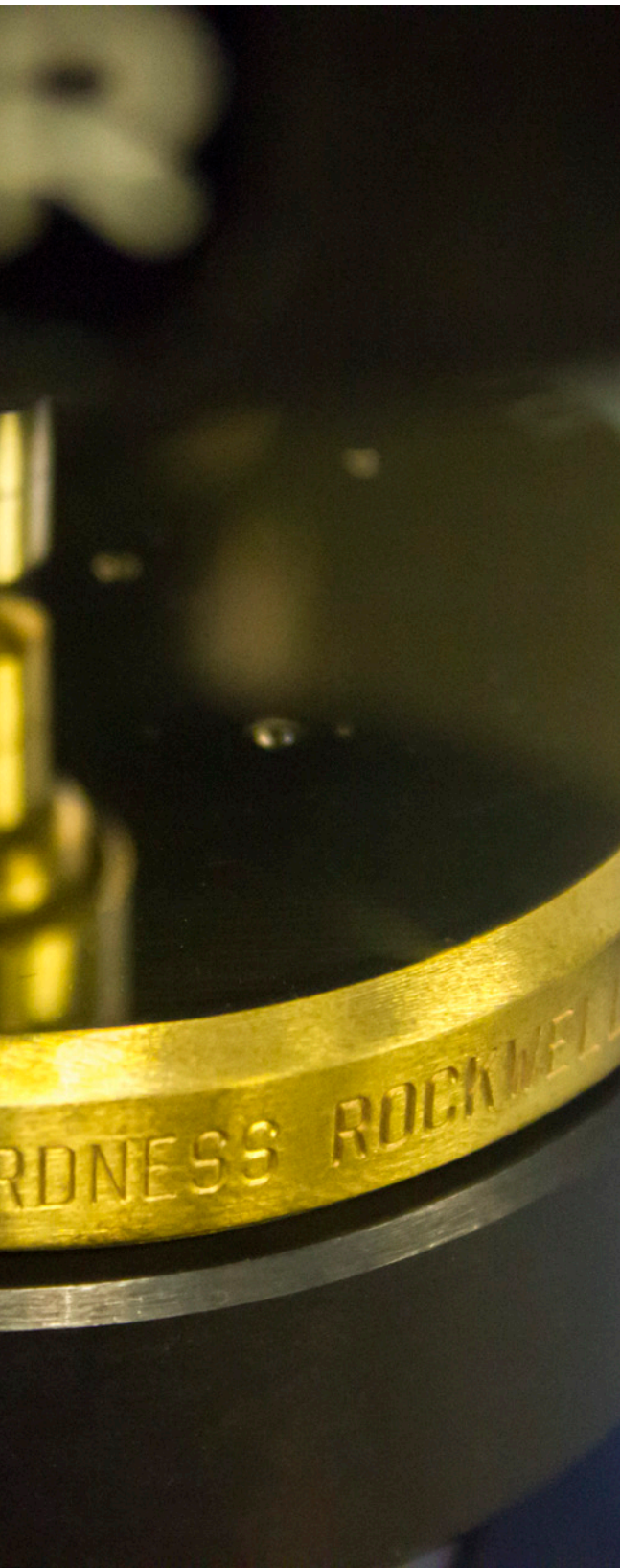


Medical



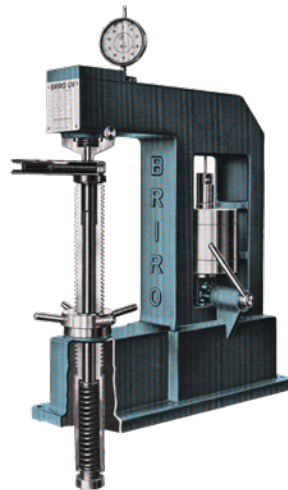
Primary
Metals





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, Reichert, 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.



*Wilson
Instruments*



 **Wilson®**

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

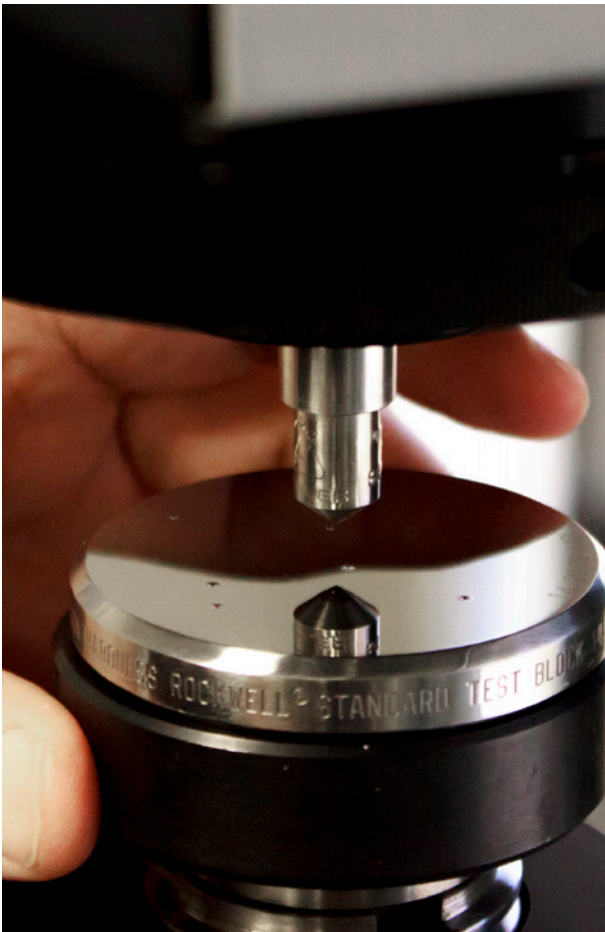


Buehler's Test Block Calibration Laboratory is accredited to ISO / IEC 17025 by the American Association for Laboratory Accreditation (A2LA). A2LA participates in the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). The ILAC MRA creates a global network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



CERT#2237.01 - CALIBRATION

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.



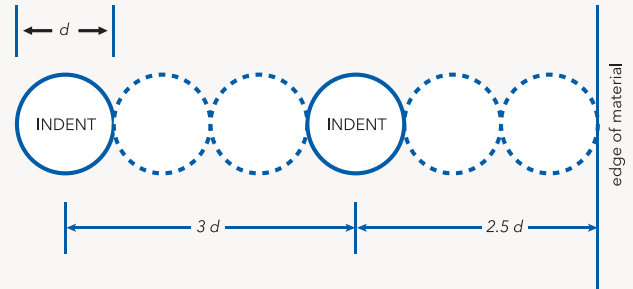
Proper Indent Spacing

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.

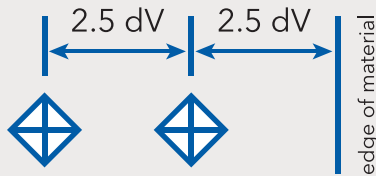
The distance from the center of any indentation to an edge of the test piece shall be at least two and a half times the diameter of the indentation.



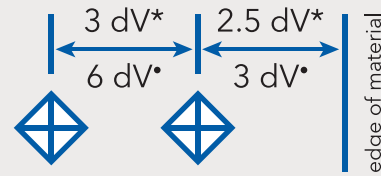
Vickers

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.



dV = Vickers Diagonal



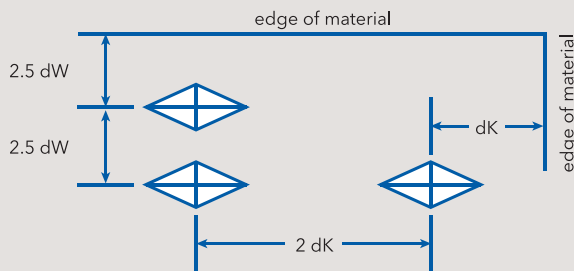
* For steel, copper and copper alloys

* For light metals, lead, tin and their alloys

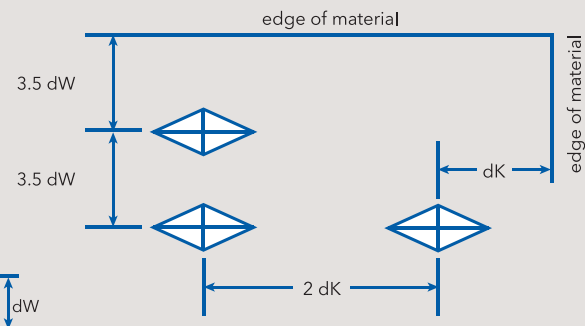
Knoop

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.



dK = Knoop Long Diagonal
 dW = Knoop Short Diagonal



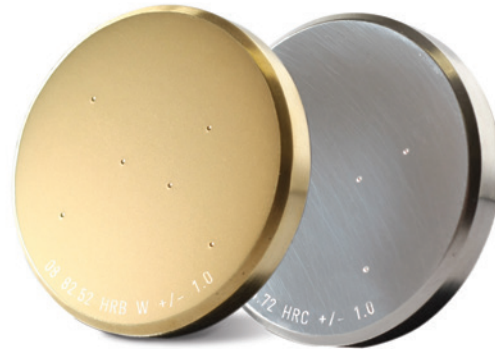
TEST BLOCK ORDERING INFO



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® Rockwell Test Blocks

	Part Number	Nominal Hardness
Rockwell A	9201110	63HRA
	9201150	73HRA
	9201190	83HRA
Rockwell B •	9202050W	40HRB
	9202060W	50HRB
	9202070W	60HRB
	9202080W	70HRB
	9202090W	80HRB
	9202100W	95HRB
Rockwell C	9203111	25HRC
	9203121	30HRC
	9203131	35HRC
	9203141	40HRC
	9203151	45HRC
	9203161	50HRC
	9203171	55HRC
	9203181	60HRC
	9203191	63HRC
Rockwell E•	9205050W	81HRE
	9205060W	87HRE
	9205070W	93HRE
Rockwell F•	9206020W	63HRF
	9206050W	79.5HRF
	9206070W	91HRF



	Part Number	Nominal Hardness
Superficial Rockwell 15-N	9212110	72HR15N
	9212150	83HR5N
	9212190	91HR15N
Superficial Rockwell 15-T•	9218020W	64HR15T
	9218050W	73.5HR15T
	9218070W	80HR15T
	9218090W	86.5HR15T
Superficial Rockwell 30-N	9213110	46HR30N
	9213130	55HR30N
	9213150	64HR30N
	9213190	80HR30N
Superficial Rockwell 30-T•	9219050W	43HR30T
	9219070W	56HR30T
	9219090W	70HR30T

• Certified using a Tungsten Carbide ball indenter

Special Order Items

Part Number	Description
9201002	Special Range/Hardness Request
9201003	Engraving for Indent Spacing
9201006	API Compliance



Wilson® Vickers-Knoop Test Blocks



Vickers Test Blocks

According to ASTM E92 & ISO 6507

Load (kg)	Part Number	Nominal Hardness	Range
HV0.1	93-001-200	200 HV	175-224
	93-001-425	425 HV	400-450
	93-001-515	515 HV	490-540
HV0.2	93-001-775	775 HV	750-800
	93-002-200	200 HV	175-224
	93-002-425	425 HV	400-450
	93-002-515	515 HV	490-540
HV0.3	93-002-775	775 HV	750-800
	93-003-200	200 HV	175-224
	93-003-310	310 HV	285-335
	93-003-425	425 HV	400-450
	93-003-515	515 HV	490-540
HV0.5	93-003-700	700 HV	675-725
	93-003-775	775 HV	750-800
	93-003-830	830 HV	805-855
	93-005-200	200 HV	175-224
	93-005-310	310 HV	285-335
HV1	93-005-425	425 HV	400-450
	93-005-515	515 HV	490-540
	93-005-700	700 HV	675-725
	93-005-775	775 HV	750-800
	93-005-830	830 HV	805-855
HV5	93-010-200	200 HV	175-224
	93-010-310	310 HV	285-335
	93-010-450	450 HV	425-475
	93-010-515	515 HV	490-540
	93-010-700	700 HV	675-725
HV10	93-010-775	775 HV	750-800
	93-010-830	830 HV	805-855
	93-100-200	200 HV	175-224
	93-100-310	310 HV	285-335
	93-100-450	450 HV	425-475
HV20	93-100-515	515 HV	490-540
	93-100-600	600 HV	575-625
	93-100-700	700 HV	675-725
	93-100-775	775 HV	750-800
	93-100-830	830 HV	805-855
HV30	93-200-200	200 HV	175-224
	93-200-310	310 HV	285-335
	93-200-450	450 HV	425-475
	93-200-515	515 HV	490-540
	93-200-600	600 HV	575-625
HV50	93-200-700	700 HV	675-725
	93-200-775	775 HV	750-800
	93-200-830	830 HV	805-855
	93-300-200	200 HV	175-224
	93-300-310	310 HV	285-335
HV100	93-300-450	450 HV	425-475
	93-300-515	515 HV	490-540
	93-300-600	600 HV	575-625
	93-300-700	700 HV	675-725
	93-300-775	775 HV	750-800
HV200	93-300-830	830 HV	805-855
	93-300-830	830 HV	805-855

Load (kg)	Part Number	Nominal Hardness	Range
HV0.1	93-050-200	200 HV	175-224
	93-050-310	310 HV	285-335
	93-050-450	450 HV	425-475
HV0.2	93-050-515	515 HV	490-540
	93-050-600	600 HV	575-625
	93-050-700	700 HV	675-725
	93-050-775	775 HV	750-800
HV0.3	93-050-830	830 HV	805-855
	93-100-200	200 HV	175-224
	93-100-310	310 HV	285-335
	93-100-450	450 HV	425-475
	93-100-515	515 HV	490-540
HV0.5	93-100-600	600 HV	575-625
	93-100-700	700 HV	675-725
	93-100-775	775 HV	750-800
	93-100-830	830 HV	805-855
	93-200-200	200 HV	175-224
HV1	93-200-310	310 HV	285-335
	93-200-450	450 HV	425-475
	93-200-515	515 HV	490-540
	93-200-600	600 HV	575-625
	93-200-700	700 HV	675-725
HV5	93-200-775	775 HV	750-800
	93-200-830	830 HV	805-855
	93-300-200	200 HV	175-224
	93-300-310	310 HV	285-335
	93-300-450	450 HV	425-475
HV10	93-300-515	515 HV	490-540
	93-300-600	600 HV	575-625
	93-300-700	700 HV	675-725
	93-300-775	775 HV	750-800
	93-300-830	830 HV	805-855
HV20	93-300-830	830 HV	805-855
	93-300-830	830 HV	805-855
	93-300-830	830 HV	805-855
	93-300-830	830 HV	805-855
	93-300-830	830 HV	805-855

Knoop Test Blocks

According to ASTM E92 & ISO 4545

Load (kg)	Part Number	Nominal Hardness	Range
HK0.5	94-005-225	225 HK	200-250
	94-005-315	315 HK	290-340
	94-005-440	440 HK	415-465
	94-005-540	540 HK	515-565
	94-005-630	630 HK	605-655
	94-005-730	730 HK	705-755
	94-005-850	850 HK	825-875

Special Order Items

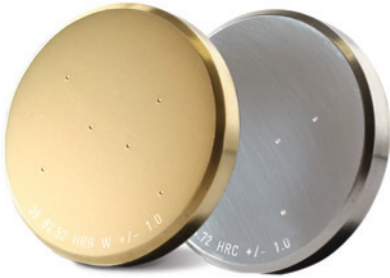
Part Number	Description
93-000-001*	Vickers Microindentation (10gf - 500gf)
93-000-002*	Vickers Macroindentation (1kgf - 50kgf)
94-000-001*	Knoop Microindentation (10gf - 500gf)
93-000-012*	2 Vickers-Knoop Calibrations
93-000-013*	3 Vickers-Knoop Calibrations
93-000-014*	4 Vickers-Knoop Calibrations

*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

Nominal value	min	max	HBW2.5/62.5 scale	HBW2.5/187.5 scale
140 HBW	115	169	WH-140HBW-625	WH-140HBW-1875
200 HBW	170	224	WH-200HBW-625	WH-200HBW-1875
250 HBW	225	274	WH-250HBW-625	WH-250HBW-1875
300 HBW	275	324	WH-300HBW-625	WH-300HBW-1875
350 HBW	325	375	WH-350HBW-625	WH-350HBW-1875
400 HBW	375	449		WH-400HBW-1875



Brinell reference blocks up to 3000kgf load

Nominal value	min	max	HBW5/750 scale	HBW10/3000 scale
140 HBW	115	169	WH-140HBW-750	WH-140HBW-3000
200 HBW	170	224	WH-200HBW-750	WH-200HBW-3000
225 HBW	212	238		WH-225HBW-3000
250 HBW	225	274	WH-250HBW-750	WH-250HBW-3000
275 HBW	262	288		WH-275HBW-3000
300 HBW	275	324	WH-300HBW-750	WH-300HBW-3000
325 HBW	312	338		WH-325HBW-3000
350 HBW	325	375	WH-350HBW-750	WH-350HBW-3000
375 HBW	362	388		WH-375HBW-3000
400 HBW	375	449		WH-400HBW-3000
500 HBW	450	525	WH-500HBW-750	WH-500HBW-3000



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:

- HRA
- HRB
- HRC
- HRE
- HRF
- HR15N
- HR30N
- HR45N
- HR15T
- HR30T
- HR45T

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.



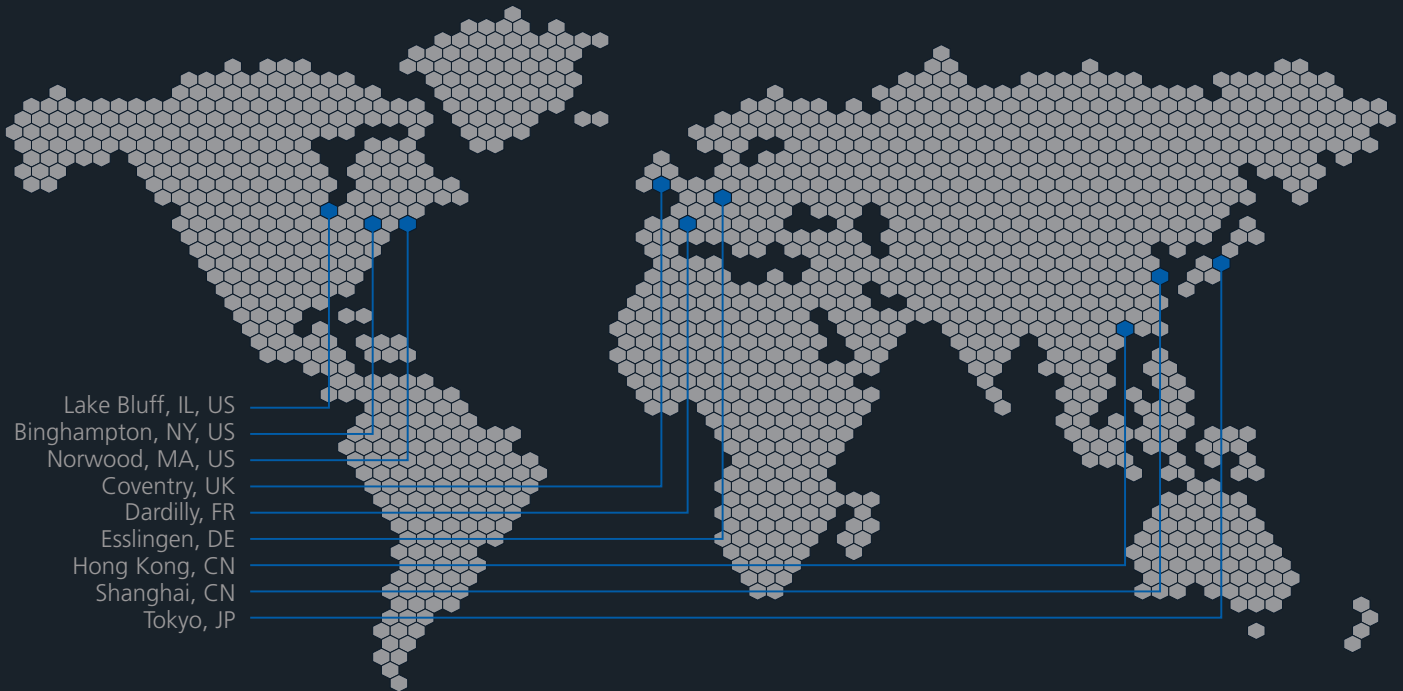
Global Service Teams

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.



Buehler Worldwide Locations



Lake Bluff, IL, US
Binghamton, NY, US
Norwood, MA, US
Coventry, UK
Dardilly, FR
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