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WOLPERT

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GROUP

Wilson Instruments
An Instron Company

75 YEARS HARDNESS TESTING



WOLPERT GROUP

WOLPERT group supplies a comprehensive range of hardness testers from Rockwell, Vickers and Brinell to complex production automation systems; including test blocks, accessories and fixtures.

WOLPERT products are predominately used to determine the hardness of metals, alloys, small precision parts, wire and plastics ranging from the softest bearing materials to the hardest steels. Our testers are used extensively in heat treat analysis and by the automotive, aerospace, steel and transportation equipment industries.

WOLPERT Group is the exclusive worldwide distribution partner of Wilson Instruments from USA, an Instron Company. Wilson Instruments introduced the first Rockwell tester to the market over 80 years ago. The simplicity and robustness of the test invented by Stanley P. Rockwell revolutionized hardness testing. It was fast, accurate and allowed the part to be used after testing.

Instron has spent millions of dollars in the development of new products using closed loop controls to revolutionize the performance of hardness testers. The results are the Rockwell 2000 and Tukon 2100 series of testers that are the best performing testers available today.

Complementary, the WOLPERT Rockwell 500 and 600 Series provide proven reliability and precision at an affordable price. If you have a hardness testing requirement, WOLPERT Group has a testing solution for you!



INDEX - WOLPERT ROCKWELL SELECTION GUIDE

Model	500-RA	500-MRA	500-MRA/L	500-MRA/S	500-MRA/LS	600-MRD	600-MRD/L	600-MRD/S	600-MRD/LS	660-RLD/R	660-RLD/S	660-RLD/T	2000-R	2000-S	2000-T
Rockwell scales															
Regular Rockwell	■	■	■			■	■			■		■	■	■	■
Superficial Rockwell				■	■			■	■		■	■		■	■
Test loads															
60kg, 100kg, 150kg [10kg pre-load]	■	■	■			■	■			■		■	■	■	■
15kg, 30kg, 45kg [3kg pre-load]				■	■			■	■		■	■		■	■
Load selection manual knob	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Load selection by menu										■	■	■	■	■	■
Load application by force lever	■														
Load application Automatic		■	■	■	■	■	■	■	■	■	■	■	■	■	■
Accuracy Conform to EN-ISO 6508, ASTM E-18 and JIS															
Hardness resolution															
0,5 of a Rockwell unit	■	■	■	■	■										
0,1 of a Rockwell unit						■	■	■	■						
0,01 of a Rockwell unit										■	■	■	■	■	■
Analogue Display	■	■	■	■	■										
Digital LCD Display						■	■	■	■	■	■	■	■	■	■
Built-in Statistical functions						■	■	■	■	■	■	■	■	■	■
Data Output															
RS-232 data output						■	■	■	■	■	■	■	■	■	■
Built-in thermal printer						■	■	■	■	■	■	■	□	□	□

- standard
- optional



ROCKWELL HARDNESS TESTER Series 500RA/500MRA™

Analogue manual or motorized versions

The Series 500 Rockwell testers are versatile, user-friendly, and provide an affordable solution for accurate Rockwell hardness scale testing, at production for quality assurance or in physical labs. A full range of sizes and models can accommodate all test scale requirements and applications. Both manual and motorized versions are available. The accuracy of our Series 500 is conforming to EN-ISO 6508, ASTM E-18 and JIS standards. All testers come with full WOLPERT test certificate and a package of standard accessories.

- Test all Rockwell regular or superficial scales (for combined twin tester see models 660 and 2000)
- Direct load selection
- Manual or motorized load application
- Large working space of 170mm or 340mm (extended version L)
- Rugged construction will stand up to the harshest environments
- Clamping nose for stabilised testing (optional)

TECHNICAL SPECIFICATIONS

Model	500-RA	500-MRA	500-MRA/L	500-MRA/S	500-MRA/LS
Rockwell scales	A, B, C, F			HRT and -N	
Test loads	60kg, 100kg, 150kg [10kg pre-load]			15kg, 30kg, 45kg [3kg pre-load]	
Test force selection	Dial				
Test force application	By force lever			Motorized (loading/dwell/unloading)	
Load duration (Dwell time)	By force lever			4 to 99 sec	
Accuracy conform to	EN-ISO 6508, ASTM E-18 and JIS				
Hardness resolution	0,5 of a Rockwell unit				
Display	Dial indicator			Dial indicator and digital dwell time indicator	
Statistics	-				
Data Output	-				
Vertical accomodation	170mm (6.7"), for long version 340mm (13.4")				
Depth from the centerline	165mm (6.5")				
Anvil	Flat O 63mm				
Specimen access	External surfaces, Cylindrical specimens down to 3 mm diameter				
Operating temperature	Range: 10 to 38°C (50 to 100F)				
Humidity	10% to 90% non condensing				
Dimensions (LxWxH)	227mm x 516mm x 715mm (Long versions 895mm high)				
Weight	85kg or 95kg for the long version				
Power supply	220/240V AC, 50Hz				

ROCKWELL HARDNESS TESTER Series 500RA/500MRA™

Analogue manual or motorized versions

Accessories

Check with your WOLPERT agent for specified packages included with the hardness tester as standard delivery.

Check latest accessories update on: www.wolpertgroup.com

- Rockwell diamond indenter
- Rockwell ball indenters and spare balls
- Flat testing table 63mm / 150mm
- V-anvil
- Spot anvil 10mm diameter
- Cylindrical anvil
- Eyeball anvil
- Goose neck anvils
- Diamond spot anvil
- Vari-rest support for long bars
- Clamping protection nose
- Four adjustable feet
- Spindle protection cover
- Dust cover
- Accessories suitcase
- Floor stand cabinet
- Rockwell hardness reference blocks:



Manual



Motorized

ROCKWELL HARDNESS TESTER Series 600MRD™

Motorized version with digital reading and output

The Series 600 Rockwell testers are versatile, user-friendly, and provide an affordable solution for accurate Rockwell hardness scale testing, at production for quality assurance or in physical labs. A full range of sizes and models can accommodate all test scale requirements and applications. Both digital and analogue versions are available. The accuracy of our Series 600 is conforming to EN-ISO 6508, ASTM E-18 and JIS standards. All testers come with full WOLPERT test certificate and a package of standard accessories.

- Easy WOLPERT+ menu for safe & sound operation
- Test all Rockwell regular or superficial scales
- Direct load selection
- Large working space of 170mm or 340mm (extended version L)
- Hardness value, statistics and conversions on backlit display
- Built-in thermal printer and data output
- Automatically corrected hardness value for cylindrical products
- Language selection
- Clamping nose for stabilised testing (optional)

TECHNICAL SPECIFICATIONS

Model	600-MRD	600-MRD/L	600-MRD/S	600-MRD/LS
Rockwell scales	A, B, C, D, E, F, G, H, K, L, M, P, R, S & V		HRN, -T, -X and -Y	
Test loads	60kg, 100kg, 150kg [10kg pre-load]		15kg, 30kg, 45kg [3kg pre-load]	
Test force selection	Dial			
Test force application	Automatic (loading/dwell/unloading)			
Load duration (Dwell time)	4 to 99 sec			
Accuracy Conform to	EN-ISO 6508, ASTM E-18 and JIS			
Hardness resolution	0,1 of a Rockwell unit			
Display	LCD-display, Hardness value, Rockwell scale, Test force indicator, Dwell time, limits (GO/NO GO)			
Statistics	No. of tests, average, S.dev., range, real time after each test			
Data Output	Built-in printer (values & statistics), RS232 serial Conversion: Vickers, Brinell, Tensile, Rockwell, Superficial Rockwell			
Vertical accommodation	170mm (6.7"), for long version 340mm (13.4")			
Depth from the centerline	165mm (6.5")			
Anvil	Flat ø 63mm			
Specimen access	External surfaces, Cylindrical specimens down to 3 mm diameter			
Operating temperature	Range: 10 to 38°C (50 to 100F)			
Humidity	10% to 90% non condensing			
Dimensions (LxWxH)	227mm x 516mm x 715mm (Long versions 895mm high)			
Weight	85kg or 95kg for the long version			
Power supply	220/240V AC, 50Hz			

ROCKWELL HARDNESS TESTER Series 600MRD™

Motorized version with digital reading and output

Accessories

Check with your WOLPERT agent for specified packages included with the hardness tester as standard delivery.

Check latest accessories update on: www.wolpertgroup.com

- Rockwell diamond indenter
- Rockwell ball indenters and spare balls
- Flat testing table 63mm
- Flat testing table 150mm
- V-anvil
- Spot anvil 10mm diameter
- Cylindrical anvil
- Eyeball anvil
- Goose neck anvils
- Diamond spot anvil
- Vari-rest support for long bars
- Clamping protection nose
- Four adjustable feet
- Spindle protection cover
- Dust cover
- Accessories suitcase
- Floor stand cabinet
- Rockwell hardness reference blocks

Vari-rest support
for long bars



Integrated thermal printer



ROCKWELL HARDNESS TESTER Series 660RLD R/S/T™

Rockwell regular, superficial and twin version closed loop hardness testers

The revolutionary Series 660 Rockwell testers offer the state-of-the art solution for flexible and very accurate Rockwell hardness scale testing, both for quality assurance or metallurgical research. The twin version model 660RLD/T features all Rockwell scales from superficial to regular, to accommodate all typical Rockwell test scale requirements and applications. A user friendly menu provides quick set up of a test and offers special features such as GO/NG judgement and cylindrical correction. The accuracy of our Series 660 easily meets the requirements of EN-ISO 6508, ASTM E-18 and JIS standards. All testers come with full WOLPERT test certificate and a package of standard accessories.

- Easy WOLPERT+ menu for safe & sound operation
- Backlit LCD screen with many functions such as Prompts to select load, indenter and scale; GO/NG judgement; display of hardness value; all test settings; statistical evaluation of the test results
- Extremely simple test cycle without overshoot thanks to the closed loop system and the precise mechanical drive mechanism
- Direct settings by membrane keyboard or external keyboard for extensive free program
- Fast travel of the test head, with built-in load protection.
- Twin model tests all Rockwell regular and superficial scales
- Fast and accurate force application by closed loop control
- Flexible fiber optic light source
- Built-in thermal printer and data output RS232
- Low maintenance with efficient load cell auto-calibration

TECHNICAL SPECIFICATIONS

Models	660RLD/R (regular), 660RLD/S (superficial) and 660RLD/T (Twin)
Rockwell scales	660RLD/R: A, B, C, D, E, F, G, H, K, L, M, P, R, S, V 660RLD/S : N, T, X, Y 660RLD/T : A, B, C, D, E, F, G, H, K, L, M, N, P, R, S, T, V, X, Y
Display conversion	to HV, HB, HR scales acc. to DIN or ASTM
Hardness resolution	0.1/0.01 of a Rockwell unit (selectable)
Test loads	660RLD: 60, 100, 150kgf (10kgf preload) 660RLD/S : 15, 30, 45kgf (3kgf preload) 660RLD/T : 15, 30, 45, 60, 100, 150kgf (3kgf and 10kgf preload)
LCD Display	Hardness value, Rockwell scale, Test force indicator, Dwell time, Limits with judgment GO/NG, Number of tests, Average, Standard deviation, Range R, Histogram
Correction	Convex and concave cylindrical surface correction
Data entry	Membrane keypad or optional external Wolpert Keyboard
Test force application	Servo mechanism + precision drive
Test load control	Closed-loop control system
Dwell time	2-99 sec, according to requirement
Data output	Built-in printer and RS232C
Accuracy	Conform EN-ISO 6508, ASTM E-18 and JIS
Specimen accommodation	Vertical space 220mm (8.6") Horizontal space (from centre-line) 190mm (7.5")
Max. travelling range of indenter	Vertical range 110mm (4.3")
Max. travelling speed	15mm/min
Power supply	220/240V 50Hz
Machine dimensions	325mm x 535mm x 970mm (w x d x h)
Net weight	95kg

ROCKWELL HARDNESS TESTER Series 660RLD R/S/T™

Rockwell regular, superficial and twin version closed loop hardness testers

Highest Depth Measurement Accuracy for Precise Results

Rockwell hardness numbers are the result of measuring the depth of indentation into the material. Therefore, the accuracy and resolution of this measurement is critical in obtaining good results.

The 660 series uses optical linear measurement technology to achieve the highest level of depth measurement accuracy and resolution available. There are no mechanical linkages or sources of friction between this measuring device and the tested part. This is a major improvement over conventional dead-weight hardness testers.

Accessories

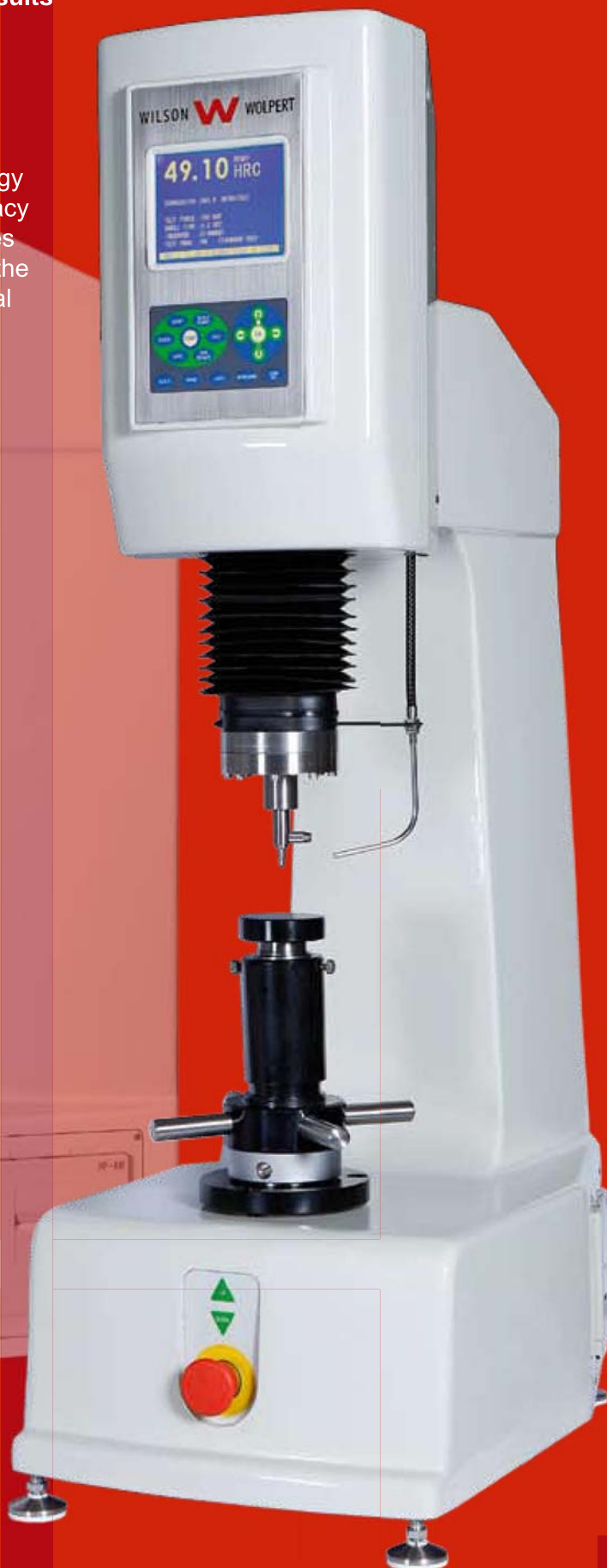
Check with your WOLPERT agent for specified packages included with the hardness tester as standard delivery.

Check latest accessories update on: www.wolpertgroup.com

- Rockwell diamond indenter
- Rockwell ball indenters and spare balls
- Flat testing table 63mm
- Flat testing table 150mm
- V-anvil
- Spot anvil 10mm diameter
- Cylindrical anvil
- Eyeball anvil
- Goose neck anvils
- Diamond spot anvil
- Vari-rest support for long bars
- Four adjustable feet
- Spindle protection cover
- Dust cover
- Accessories suitcase
- Floor stand cabinet
- Rockwell hardness reference blocks



Integrated thermal printer



Original Wilson USA Rockwell testers

The Rockwell 2000 series hardness tester uses a unique closed-loop electronic control system and load cell mounted directly on the indenter (U.S Patent No. 5,616,857) to eliminate errors. This ensures that preliminary and total forces are applied with unparalleled accuracy and repeatability, from day to day, operator to operator and tester to tester.

The 2000 series uses optical linear measurement technology to achieve the highest level of depth measurement accuracy and resolution available. There are no mechanical linkages or sources of friction between this measuring device and the tested part. This is a major improvement over conventional dead-weight hardness testers.



TECHNICAL SPECIFICATIONS

Model	2000-R	2000-S	2000-T
Rockwell scales	A, B, C, D, E, F, G, H, K, L, M, P, R, S & V	15N,30N,45N,15T,30T,45T 15W,30W,45W,15X,30X, 45X, 15Y,30Y,45Y	A, B, C, D, E, F, G, H, K, L, M, P, R, S & V 15N,30N,45N,15T,30T,45T 15W,30W,45W,15X,30X, 45X, 15Y,30Y,45Y
Test loads	60kg, 100kg, 150kg [10kg pre-load]	15kg, 30kg, 45kg [3kg pre-load]	15kg, 30kg, 45kg, 60kg, 100kg, 150kg [3kg and 10kg pre-load]
Test force selection	Automatic		
Test force application	Automatic (loading/dwell/unloading)		
Test force type	Closed-loop electronic load cell		
Load duration (Dwell time)	3 to 99 sec		
Accuracy Conform to	EN-ISO 6508, ASTM E-18 and JIS		
GR&R performance	<5%		
Hardness resolution	0,1 or 0,01 of a Rockwell unit		
Testing height			
Size 1 (2001)	153mm (6.0")		
Size 2 (2002)	255mm (10.0")		
Size 3 (2003)	355mm (14.0"), minimum height 203mm		
Statistics	No. of tests, average, S.dev., range, real time after each test, Histogram		
Data Output	Built-in printer (values & statistics), RS232 serial		
Conversion:	Vickers, Brinell, Tensile, Rockwell, Superficial Rockwell		
Enhanced panel Memory	20 test programs and 20,000 hardness values		
Light source	Flexible fiber optic		
Depth from the centerline	216mm (8.5")		
Anvil	Flat anvil O 63mm		
Specimen access	External surfaces, Cylindrical specimens down to 3 mm diameter		
Operating temperature	Range: 10 to 38°C (50 to 100F)		
Humidity	10% to 90% non condensing		
Dimensions (LxWxH)			
Size 1 (2001)	590mm x 343mm x 1029mm and 100kg (220lb)		
Size 2 (2002)	590mm x 343mm x 1232mm and 107kg (236lb)		
Size 3 (2003)	590mm x 554mm x 1341mm and 111kg (245lb)		
Power supply	100, 110, 220 or 240 VAC ±10%, 47 to 63 Hz. Single phase		

Original Wilson USA Rockwell testers

The Rockwell RB2000 series hardness testers provide the user with the advantage of selecting and ordering a configured system specific to your testing needs. The modular ordering system of the RB2000 provides complete flexibility in choosing instrument size, scales and components such as indenters, test blocks and anvils.

- ASTM and ISO compliant, closed-loop control insures unmatched test accuracy and repeatability
- Guaranteed GR&R (Gage Repeatability and Reproducibility) of 5% or less
- Encoder based, high precision, optical displacement measurement system
- Intuitive, bright and crisp display/control panel
- Logical menu drive system with soft keys and user friendly operation
- Large clear fluorescent back-lit display with status icons that indicate indenter type, scale, conversion, cylindrical correction and tolerances
- Meets or exceeds current versions of ASTM E 18, DIN, EN, ISO 6508-1 and other standards
- 2000 series main unit size 1, 2 or 3
- Regular, Superficial or Twin
- Diamond and/or Ball indenters
- Test blocks in selectable scale and hardness
- Wide range of test tables, anvils and fixtures
- Control (SPC) software
- Power supply adapted to your region.
- Various printers
- Enhanced operator panel provides reports and statistics
- User programmable storage (up to 20,000 hardness values)

Check with your WOLPERT agent for specified packages included with the hardness tester as standard delivery.

Check latest accessories update on: www.wolpertgroup.com



**Also available: 2000MRT
Micro Rockwell tester**



New indenter snap grip eliminates traditional gripsel, provides increased repeatability by eliminating side loading of the indenter

TWIN Rockwell hardness testers with analogue or digital reading

The Wilson Rockwell 500 tester series provides proven reliability and precision at an affordable price. This rugged and reliable design is the proven industry leader in its category and is the benchmark for cost efficient Rockwell hardness testing. Model 500 testers provide motorized application and removal of major loads while precisely controlling the rate of load application. This provides a completely uniform force application and smoother overall test process. Major load dead weights are carefully calibrated at the factory for uniformity from one instrument to another. The weights are enclosed in the aluminum frame and selected by means of a dial on the side of the unit. The operation of the 500 tester is as simple as choosing the desired scale, turning the load dial to the value appropriate to the scale and turning the capstan until the display indicates that the minor load has been reached (on digital models an integrated brake automatically stops the hand wheel). At that point, the tester operates automatically, applying and releasing the major load and displaying the test results.

Analog Model 504T features:

- Color-coded analog display for fast, accurate reading
- Precision calibrated force system
- Motorized load application
- Dial load selection
- Thrust needle bearing capstan hand-wheel
- Conforms to current versions of ASTM E 18 and ISO 6508

Digital Model 524T features:

- Easy-to-use digital display
- RS232 C serial data port for computer or printer interface
- Load selection error safeguard
- Automatic minor load set auto-brake system
- Automatic electronic scale conversion
- Microprocessor control of dwell and recovery time
- Thrust needle bearing capstan hand-wheel
- Conforms to current versions of ASTM E 18 and ISO 6508
- Plastics mode testing in accordance with ASTM D 785



Technical Specifications

	524T	504T
Model Number	524T	504T
Vertical Capacity	305 mm	305 mm
Throat Depth	158 mm	158 mm
Hardness Parameters	Rockwell regular and superficial scales	
Standards Compliance/ Accuracy	Exceeds ASTM E 18-03 and EN-ISO 6508	
Test Force Application Type	Dual calibrated springs (minor loads), deadweight stack (major load)	
Preliminary Test Force	3 kgf (29.4N) and 10 kgf (98.07 N)	
Total Test Force (Major Loads)	15 kg (147.1 N), 30 kg (294.2 N), 45 kg (441.3 N) 60 kgf (588.4 N), 100 kgf (980.7 N), 150 kgf (1471 N)	
Readout	Digital panel	Analog color coded dial
Test Cycle Type 524T	Motorized (manual preload, auto trip, auto-brake)	
Test Cycle Type 504T	Motorized (manual preload, manual trip)	
Data output	RS232	N/A
Data Memory	9999 tests	N/A

ROCKWELL HARDNESS TESTING ACCESSORIES

Selection of anvils for correct hardness testing

Tips on using an anvil for accurate hardness testing

To keep the test specimen stationary and provide support, always use the smallest anvil possible. When using test blocks, a pedestal spot anvil is recommended. Always ensure that the anvil's top surface and its supporting contact surface are free of dirt, grindings, oil or corrosion. If the indenter or other object has left a mark on the anvil test surface or seat, the anvil will cause false readings and should be replaced.

Testing table large

The Ø 150mm test table is the most popular work support for large test specimen. The table is screwed onto the elevating screw. The vertical capacity (accommodation) will be reduced by about 25mm.

Flat anvil

The Ø 60mm flat anvil is used to support many flat specimens perpendicular to the indenter.

V-anvil

The standard V-anvil is used with cylindrical shaped rods or tubes of Ø 6mm or larger. (Not suitable for thin wall or soft tubing).

Pedestal spot anvil

The Ø 10mm spot anvil is used with small parts and sheet metal where not much is required. This anvil should be used with test blocks.

Cylindrical anvil

This anvil is designed to support cylindrical work and has a capacity of 50mm to 203mm (2"-8"). A smaller version is also available from 6mm to 76mm (1/4"-3").

Eyebal anvil

Mounted on an elevating screw, this anvil is designed for test pieces that have a slight taper. The ball is clamped into position by a clamping nut which allows the indenter to come into contact with a flat surface.

Goose neck anvils for thin wall tubes

A range of anvils are available for testing the outside diameter of thin wall tubing or rings with an inside diameter of 6.35mm (1/4") or more, to a maximum of 50.8mm (2"). For secure positioning, the anvil is clamped to an elevating screw by means of a nut. This anvil includes a 6.35mm (1/4") mandrel as standard equipment. Ask for sizes and specifications.



ROCKWELL HARDNESS TESTING ACCESSORIES

Selection of anvils for correct hardness testing

Goose neck adapters for internal testing

A range of adapters is available to perform internal tests on rings, tubes or annular parts where the inside diameter, plus the wall thickness, is less than 50,8mm (2"). These adapters must be combined with special Gooseneck indenters. Ask for technical details based on your specific application.

Diamond spot anvil

This anvil is recommended for supporting thin, soft sheet metal. The centre of the anvil has a flat, polished, diamond surface. As the sample deforms under the test load, this surface standardizes the frictional effect between the anvil and the thin sheet metal. The diamond spot anvil should be used only with a Rockwell superficial hardness tester and steel ball indenter. It should never be used with a diamond indenter or with a regular test scale tester.



Vari-rest supports

This fixture is clamped to the top of the elevating screw then adjusted to bring the work piece into correct relationship with the anvil and indenter. Numerous parts can be tested with the same setup simply by raising and lowering the elevating screw. Support Size 7 has a distance from the centre of the elevating screw to the end of the support tube of 355.6mm / 14". Support Size 8 has a distance from the centre of the elevating screw to the end of the support tube of 660.4mm / 26".



Anvil for round specimen

This anvil is designed for testing ball bearings and other round specimens. The concave testing seat insures alignment of the spherical test specimen with the test indenter. Used for 1.5mm (1/16") to 25.4mm (1") round specimens.



Clamping protection nose

Device to be mounted on indenter head, to keep the specimen into place by internal spring force, and to protect the indenter against collision.



Floor stand metal cabinet

The Rockwell floor stand is a sturdy, heavy metal cabinet for securing your Rockwell tester. Two models are available with locking door and drawer for small parts and accessories. The wooden working table is drilled for access of the elevating screw.



ROCKWELL INDENTERS AND REFERENCE BLOCKS

With official calibration certificates UKAS, DKD or NVLAP/ASTM

WOLPERT offers a wide range of indenters & reference blocks. All certified indenters and reference blocks will be issued with a certificate traceable to internationally recognised standards such as UKAS, DKD or ASTM. We also offer economical factory certified indenters and reference plates.

Indenters type WOLPERT-group UKAS, DKD, ASTM,
Rockwell Regular scale Diamond cone 120°
Rockwell Superficial scale Diamond cone 120°
Rockwell Steel ball indenters 1/16" – 1/8" – 1/4" – 1/2"
Rockwell Carbide ball indenters 1/16" – 1/8" – 1/4" – 1/2"



WOLPERT hardness reference blocks are used for annual verification and calibration of hardness testing machines, as well as for periodical check and sometimes for overtaking of hardness scales on a hardness testing machine. That's why hardness reference blocks are a necessary help of industrial Quality Management. Only the use of high quality, precise hardness reference blocks calibrated to applicable standards can ensure the functionality and relative reliability and accuracy of measurement of a hardness testing machine. A hardness reference block shall only be used as according to the standards to that method and test condition for which it was calibrated.

All WOLPERT hardness reference block certificates for Rockwell and Superficial-Rockwell are based on following international standards:

DIN-EN-ISO 6508-3
ASTM E 18, ASTM B254

Order your blocks based on nominal values. Please ask for our separate product list of nominal hardness values available per hardness scale and type of certificate.



Of course WOLPERT can also supply certified indenters and reference blocks for other hardness scales such as Brinell, Vickers and Knoop.



UNIVERSAL BRINELL

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