

# equotip<sup>®</sup> 3



## PORTABLE HARDNESS TESTER

- Large, easy to read display with backlight
- Highly accurate  $\pm 4$  HL
- Automatic correction for impact direction
- Converts to all common hardness scales (HV, HB, HRC, HRB, HS,  $R_m$ )
- Light weight and easy to use
- Fast testing for a wide range of applications
- Large memory with on-screen review of data
- Download to PC or print directly via USB, Ethernet, or RS-232
- User profiles for fast change of all settings
- Rugged sealed membrane keypad
- Internal rechargeable batteries or standard "C" cells
- Custom conversions for uncommon alloys



Standardized according to ASTM A956 and DIN 50156  
Equotip3, a high quality Swiss product

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## Application Range

- Good for all metals
- Ideal for production level testing
- Best suited for on-site testing of heavy, big or already installed parts
- Handy for difficult to access or confined test locations
- Automatic compensation for impact direction
- Excellent for material selection and acceptance tests
- Easy to use and accurate on curved test surfaces (R > 10 mm)

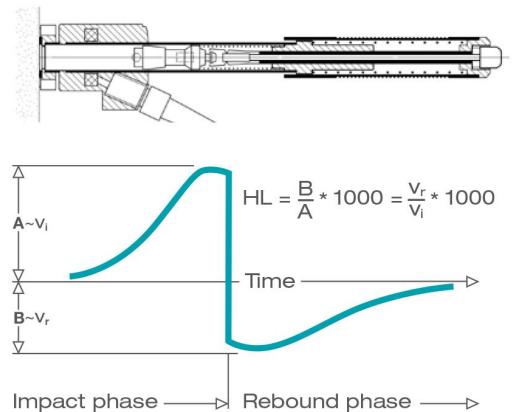
## Primary Industries

- Metal production & processing
- Automotive & transportation
- Machinery & power plants
- Petro-chemical, refineries
- Aerospace & shipyard
- Metal constructions
- Testing services & laboratories

## The Equotip Measuring Principle

Equotip uses a proven, dynamic testing principle. An impact body with a hard metal test tip is propelled by spring force against the surface of the test piece. Surface deformation takes place when the impact body hits the test surface, which will result in loss of kinetic energy. This energy loss is detected by a comparison of velocities  $v_i$  and  $v_r$  when the impact body is at a precise distance from the surface for both the impact and rebound phase of the test, respectively.

Velocity measurements are achieved through a permanent magnet in the impact body that generates an induction voltage in the coil of the impact device. The signal voltage is proportional to the velocity of the impact body. Signal processing provides the hardness reading for display and storage.



## Performing the Hardness Test

**Easy to use** – simple operating elements allow for accurate measurements even by occasional users.



### 1. Load

Simply load the impact device by sliding the loading tube forward.



### 2. Place

Then place and hold the impact device on the surface of the test piece at the desired test point.



### 3. Measure

Trigger the impact by pressing the trigger button. The hardness value will be instantaneously displayed.



### 4. Display

Showing all information on a large clear display.

Modern electronics with power saving features provide for long operating life. The large LCD display always shows how the Equotip is configured to test. Variable function keys allow for quick change of common test parameters, and the on screen hint line shows the other active control keys. The context sensitive help files give the operator quick access to the operating instructions with the press of a single button.

No subjective measuring errors are possible, giving highly repeatable results. Internal self diagnostics with error messages assure reliable test results. Readings can be stored automatically in the internal memory or sent directly to a printer. PC evaluation software allows for data analysis.



## Advanced Equotip<sup>®</sup> 3 Impact Devices

Equotip<sup>®</sup> 3 impact devices D, G, C, E, S consisting of:

Equotip<sup>®</sup> 3 impact device, impact body, support rings, cleaning brush, cable (4-pole)

Equotip<sup>®</sup> 3 impact devices DL consisting of:

Equotip<sup>®</sup> 3 impact device, impact body, support rings, cleaning brush, cable (4-pole), perspex sleeve

Equotip<sup>®</sup> 3 impact devices DC consisting of:

Equotip<sup>®</sup> 3 impact device, impact body, support rings, cleaning brush, cable (4-pole), loading stick



Type	Part number	Application area	Impact energy	Indenter
C	353 00 500	Reduced impact energy. For surface-hardened components, coatings, thin or impact-sensitive parts (small indentation).	3 Nmm	Tungsten carbide 3 mm
D	353 00 100	Most widely used probe. For the majority of testing applications.	11 Nmm	Tungsten carbide 3 mm
DC	353 00 110	Short impact device. For applications in restricted spaces, e.g. in bores, cylinders or for measurements in assembled machines.	11 Nmm	Tungsten carbide 3 mm
DL	353 00 120	Slim measuring nose. For measurement under extreme space limitations or on the floor of grooves.	11 Nmm	Tungsten carbide 2.8 mm
E	353 00 400	Diamond indenter. For measurements in extreme hardness ranges (above 50 HRC / 650 HV). Tool steels with high carbide content.	11 Nmm	Polycrystalline diamond 3 mm
G	353 00 300	Increased impact energy. Solid components, e.g. heavy-duty casts and forged parts.	90 Nmm	Tungsten carbide 5 mm
S	353 00 200	Ceramic indenter. For measurements in extreme hardness ranges (above 50 HRC / 650 HV). Tool steels with a high carbide content.	11 Nmm	Ceramics 3 mm



## Equotip3 Measuring Range

Fields of application			D/DC	DL	S	E	G	C
1 Steel and cast steel	Vickers Brinell Rockwell	HV	81-955	80-950	101-964	84-1211		81-1012
		HB	81-654	81-646	101-640	83-686	90-646	81-694
		HRB	38-100	37-100			48-100	
	Shore Rm N/mm <sup>2</sup>	HRC	20-68	21-68	22-70	20-72		20-70
		HRA			61-88	61-88		
		HS	30-99	31-97	28-104	29-103		30-102
		σ1	275-2194	275-2297	340-2194	283-2195	305-2194	275-2194
		σ2	616-1480	614-1485	615-1480	616-1479	618-1478	615-1479
		σ3	449-847	449-849	450-846	448-849	450-847	450-846
2 Cold work tool steel	Vickers Rockwell C	HV HRC	80-900 21-67	80-905 21-67	104-924 22-68	82-1009 23-70		98-942 20-67
3 Stainless steel	Vickers Brinell Rockwell	HV	85-802		119-934	88-668		
		HB	85-655		105-656	87-661		
		HRB	46-102		70-104	49-102		
		HRC	20-62		21-64	20-64		
4 Cast iron lamellar graphite GG	Brinell Vickers Rockwell	HB	90-664				92-326	
		HV	90-698					
		HRC	21-59					
5 Cast iron, nodular graphite GGG	Brinell Vickers Rockwell	HB	95-686				127-364	
		HV	96-724					
		HRC	21-60					
6 Cast aluminium alloys	Brinell Vickers Rockwell	HB	19-164	20-187	20-184	23-176	19-168	21-167
		HV	22-193	21-191	22-196	22-198		
		HRB	24-85				24-86	23-85
7 Copper/zinc-alloys (brass)	Brinell Rockwell	HB	40-173					
		HRB	14-95					
8 CuAl/CuSn-alloys (bronze)	Brinell	HB	60-290					
9 Wrought copper alloys, low alloyed	Brinell	HB	45-315					

## Test Piece Requirements

	Impact devices D, DC, DL, E, S	C	G
<b>Preparation of the surface</b>			
Roughness class ISO	N7	N5	N9
Max. roughness depth R <sub>t</sub>	10 μm / 400 μinch	2.5 μm / 100 μinch	30 μm / 1200 μinch
Centre line average CLA, AA, R <sub>a</sub>	2 μm / 80 μinch	0.4 μm / 16 μinch	7 μm / 275 μinch
<b>Min. weight of samples</b>			
of compact shape	5 kg / 11 lbs	1.5 kg / 3.3 lbs	15 kg / 33 lbs
on solid support	2 kg / 4.5 lbs	0.5 kg / 1.1 lbs	5 kg / 11 lbs
coupled on plate	0.05 kg / 0.2 lbs	0.02 kg / 0.045 lbs	0.5 kg / 1.1 lbs
<b>Min. thickness of sample</b>			
uncoupled	25 mm / 0.98 inch	15 mm / 0.59 inch	70 mm / 2.73 inch
coupled	3 mm / 0.12 inch	1 mm / 0.04 inch	10 mm / 0.4 inch
surface layer thickness	0.8 mm / 0.03 inch	0.2 mm / 0.008 inch	

	Impact devices D, DC, DL, E, S	C	G
<b>Indentation size on test surface</b>			
<b>with 300 HV, 30 HRC</b>			
diameter	0.54 mm / 0.021 inch	0.38 mm / 0.015 inch	1.03 mm / 0.04 inch
depth	24 μm / 960 μinch	12 μm / 480 μinch	53 μm / 2120 μinch
<b>with 600 HV, 55 HRC</b>			
diameter	0.45 mm / 0.017 inch	0.32 mm / 0.012 inch	0.9 mm / 0.035
depth	17 μm / 680 μinch	8 μm / 2560 μinch	41 μm / 1640 μinch
<b>with 800 HV, 63 HRC</b>			
diameter	0.35 mm / 0.013	0.30 mm / 0.011 inch	
depth	10 μm / 400 μinch	7 μm / 280 μinch	



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## Equotip<sup>®</sup> Test Blocks

Proceq is world-leading with its wide range of different Leeb metal hardness test blocks and the only producer of Leeb instruments who addresses all relevant standards (e.g. DIN 50156, ASTM 956-06) completely. Test blocks are an essential component of any hardness testing equipment.

Blocks of various hardness levels are available as required by national measurement standards. The customers should choose the blocks based on the hardness level which is used for their particular application. This guarantees that the instrument's functionality can be verified on-site within the correct hardness range.



Equotip test blocks are delivered calibrated with the impact device that the customer uses to check his metal parts, e.g. in HLD, HLDL, HLE. This means that the calibrations are precise and are not based on conversions. Calibration certificates are issued by Proceq (factory calibration) or an accredited institute (national traceability), as per customer request.

## Technical Information

**DIMENSIONS:** 170 x 200 x 45 mm (6.7 x 7.9 x 1.8 inches)

**WEIGHT:** 780g plus approx. 120g battery pack

**UNIT MATERIAL:** shock resistant ABS plastic

**UNIT DISPLAY:** large, QVGA LCD with adjustable contrast and backlight

**RESOLUTION:** 1 HL; 1 HV; 1 HB; 0.1 HRC; 0.1 HRB; 0.1 HS; 1 N/mm<sup>2</sup> R<sub>m</sub>

**INTERNAL DATA STORAGE:** ~ 100'000 measured values

**BATTERY TYPE:** rechargeable Li-Ion or 3 standard size "C" cells

**OPERATING TEMPERATURE:** 0 to +50°C (32 to 122°F)

**STORAGE TEMPERATURE:** -10 to +60°C (14 to 140°F)

**HUMIDITY:** 90% max.

**INPUT-SOCKETS IMPACT DEVICES:** 20-pole

**COMMUNICATION:** Ethernet, USB & RS-232. Bi-directional with PC

**PC APPLICATION PROGRAM:** Equolink 3

**ACCURACY:** ± 4 HL

## Standards and Guidelines applied

ASTM A956 (2006)

ASME CRTD-91 (2009)

DIN 50156 (2007)

DGZfP Guideline MC 1 (2008)

VDI / VDE Guideline 2616 Paper 1 (2002)

Nordtest Technical Reports 99.12, 99.13, 99.36

GB/T 17394 (1998)

JB/T 9378 (2001)

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## Ordering Information

### 353 10 100 Equotip3 Hardness Tester, unit D, includes

Equotip3 indicating device, AC adapter, Equotip3 impact device D with cable, test block D, USB-cable, Equotip CD, cleaning brush, coupling paste, carrying case, support ring D6 and D6a, operating instructions, quick reference guide, calibration certificate

### 353 10 300 Equotip3 Hardness Tester, unit G, includes

Equotip3 indicating device, AC adapter, Equotip3 impact device G with cable, test block G, support ring G6 and G6a, carrying case, USB-cable, Equotip CD, cleaning brush, operating instructions, quick reference guide, calibration certificate

For other combinations, use Equotip3 basic unit with impact device and test block.

### 353 10 050 Equotip3 Hardness Tester, basic unit, includes

Equotip3 indicating device, AC adapter, carrying case, USB-cable, Equotip CD, operating instructions and quick reference guide. The customer needs to buy the appropriate impact device and test block in addition to the Equotip 3 basic unit



353 10 100 unit D



353 10 300 unit G



353 10 050 basic unit

## Accessories

353 00 091	Equotip 3 Automation Package
353 00 070	Protective carry pocket for Equotip 3 indicating device
380 00 079	Carrying strap adjustable, with padding (use together with 380 00 070)
353 00 080	Equotip3 impact device cable 1.5 m 4-pole
353 00 086	Equotip3 impact device extension cable 5 m 4-pole
353 00 083	Impact device cable existing Equotip2 impact device to new Equotip3 display device
353 00 084	Impact device cable new Equotip3 impact device to existing Equotip2 display device
351 90 018	USB cable, 1.8m
350 00 082	Equotip3 RS-232 adapter cable for connection to printer
353 00 029	Rechargeable Equotip3 battery
353 03 000	Set of support rings (12 pcs.)
350 01 015	Coupling paste

Subject to change without notice.

All information contained in this documentation is presented in good faith and believed to be correct. Proceq SA makes no warranties and excludes all liability as to the completeness and/or accuracy of the information. For the use and application of any product manufactured and/or sold by Proceq SA explicit reference is made to the particular applicable operating instructions.

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