

Equotip 3

The Equotip 3 is a versatile portable hardness testing solution using the dynamic Leeb rebound technique which was invented by Proceq.



Proceq has combined today's technology with its over 35 years of Equotip know-how and customer feedback to create the Equotip 3 - a portable instrument that offers extended capabilities and unmatched ease of operation.

Features

- The Equotip 3 is a hand-held device with a rugged shock-resistant housing and sealed membrane keypad
- Large and clear display with adjustable contrast and backlight
- It converts directly to all common hardness scales (HV, HB, HRC, HRB, HRA, HS, Rm); creates and uses another up to 20 customer-specific conversions for uncommon alloys
- Highly accurate ± 4 HL (0.5% at 800 HL) with automatic correction for impact direction
- Wide measurement range
- Simple operating menu structure and extensive on-screen help files
- Internal storage of ~100'000 measured values in a flexible user-defined file/folder structure
- User profiles for a quick change of test setup (with password protection)
- Down-/upload data from/to PC via USB, Ethernet or RS-232
- Free and easy upgrades of the Equotip firmware and Equolink software via internet

Applications

- Good for most metals
- Excellent for material selection, acceptance and production level testing
- Ideal for on-site testing of heavy and large components before and after installation
- Handy for difficult to access or confined test locations
- Accurate also on curved test surfaces ($R > 10$ mm)

Proceq offers a unique variation of impact devices and support rings to serve both common as well as special applications.

Primary Industries

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



Warranties

- Standard 2-year limited warranty on electronic indicating units
- Optional extended warranty periods up to 3 years

Standardization

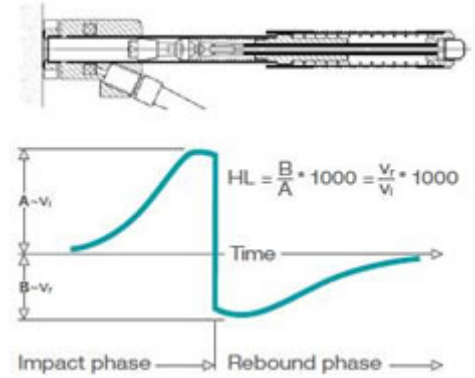
- ASTM A956
- DIN 50156
- DGZfP Guideline "Mobile Härteprüfung"
- VDI / VDE Guideline 2616 Paper 1



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The EQUOTIP measuring principle

The EQUOTIP measuring principle is physically a rather simple, dynamic hardness test. 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 calculated by velocity measurements when the impact body is at a precise distance from the surface for both the impact and rebound phase of the test. The permanent magnet in the impact body generates an induction phase of voltage in the single coil of the impact device. The voltage of the signal is proportional to the velocity of the impact body, and signal processing by the electronics 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.



Display of 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.

Technical Data

Equotip 3 unit incl. probe

Testing method	Leeb rebound
Available probes	C, D, DC, DL, E, G, S
Spherical test tip	Tungsten carbide, 3 mm diameter (for C, D, DC, DL probes) 5 mm diameter (for G probe.) Polycrystalline diamond / ceramics 3 mm diameter for E / S
Min. radius of surface curvature	10 mm
Resolution	1 HL; 1 HV; 1 HB; 0.1 HRC; 0.1 HRB; 0.1 HRA; 0.1 HS; 1 MPa (1 N/mm ²)
Accuracy	± 4 HL (0.5% at 800 HL)

Equotip 3 indicating device

Dimensions	170 x 200 x 45 mm
Weight	780 g plus approx. 120 g battery pack
Material	shock resistant ABS plastic
Display	large QVGA LCD with adjustable contrast and backlight
Internal data storage	100'000 values
Communication	Ethernet, USB & RS 232
PC application	Equolink 3 software included
Battery type	rechargeable Li ion or 3 standard size "C" cells
Operating temperature	0 to + 50 °C
Storage temperature	-10 to + 60 °C
Humidity	90 % max.



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Impact Devices



Impact device D
Part No 353 00 100

EQUOTIP® 3 basic impact device D with impact body, support rings, cleaning brush, cable (4-pole)

Application

For the majority of your hardness testing requirements.

Probe weight 75g



Impact device DL
Part No 353 00 120

EQUOTIP® 3 basic impact device DL with impact body, support rings DL, cleaningbrush, cable (4-pole)

Application

For measurements in extremely confined spaces or at the base of grooves.

Probe weight 100 g

Note: The impact device DL can only be used with manual correction for impact direction.



Impact device S
Part No 353 00 200

EQUOTIP® 3 basic impact device S with impact body, support rings, cleaning brush, cable (4-pole)

Application

For measurements in the extremely high hardness range (always in excess of 50 HRC/650 HV): Tool steels with high carbide content inclusions.

Probe weight 80 g



Impact device DC
Part No 353 00 110

EQUOTIP® 3 basic impact device DC with impact body, support rings, cleaning brush, cable (4-pole)

Application

Use in very confined spaces, e.g. in holes, cylinders or for internal measurements on assembled machines.

Probe weight 50 g



Impact device G
Part No 353 00 300

EQUOTIP® 3 basic impact device G with impact body, support rings, cleaning brush, cable (4-pole)

Application

Solid components. e.g. heavy castings and forgings.

Probe weight 250 g



Impact device E
Part No 353 00 400

EQUOTIP® 3 basic impact device E with impact body, support rings, cleaning brush, cable (4-pole)

Application

For measurements in the extremely high hardness range (always in excess of 50 HRC/650 HV): Tool steels with high carbide content inclusions.

Probe weight 80 g



Impact device C
Part No 353 00 500

EQUOTIP® 3 basic impact device C with impact body, support rings, cleaning brush, cable (4-pole)

Application

Surface hardened components, coatings, thin walled or impact sensitive components (small measuring indentation).

Probe weight : 75 g

Equotip 3 Measuring Range

Fields of Application			D/DC	DL	S	E	G	C
Steel & cast steel	Vickers	HV	81-955	80-950	101-964	84-1211		81-1012
	Brinell	HB	81-654	81-646	101-640	83-686	90-646	81-694
	Rockwell	HRB	38-100	37-100			48-100	
		HRC	20-68	21-68	22-70	20-72		20-70
		HRA			61-88	61-88		
	Shore	HS	30-99	31-97	28-104	29-103		30-102
	Rm N/mm ²	σ 1	275-2194	275-2297	340-2194	283-2195	305-2194	275-2194
σ 2		616-1480	614-1485	615-1480	616-1479	618-1478	615-1479	
σ 3		449-847	449-849	450-846	448-849	450-847	450-846	
Cold work tool steel	Vickers	HV	80-900	80-905	104-924	82-1009		98-942
	Rockwell	HRC	21-67	21-67	22-68	23-70		20-67
Stainless steel	Brinell	HB	85-802		119-934	88-668		
	Vickers	HV	85-655		105-656	87-661		
	Rockwell	HRB	46-102		70-104	49-102		
		HRC	20-62		21-64	20-64		
Cast iron lamellar graphite GG	Brinell	HB	90-664				92-326	
	Vickers	HV	90-698					
	Rockwell	HRC	21-59					
Cast iron, nodular graphite GGG	Brinell	HB	95-686				127-364	
	Vickers	HV	96-724					
	Rockwell	HRC	21-60					
Cast aluminium alloys	Brinell	HB	19-164	20-187	20-184	23-176	19-168	21-167
	Vickers	HV	22-163	21-191	22-196	22-198		
	Rockwell	HRB	24-85				24-86	23-85
Copper/Zinc alloys (brass)	Brinell	HB	40-173					
	Rockwell	HRB	14-95					
CuAl/CuSn alloys (bronze)	Brinell	HB	60-290					
Wrought copper alloys, low alloyed	Brinell	HB	45-315					

Test piece requirements

	Impact Devices D, DC, DC, DL, E, S	C	G
Preparation of the surface			
Roughness class ISO	N7	N5	N9
Max. roughness depth Rt	10 µm	2.5 µm	30 µm
Centre line average CLA, AA, Ra	2 µm	0.4 µm	7 µm
Min. weight of samples			
of compact shape	5 kg	1.5 kg	15 kg
on solid support	2 kg	0.5 kg	5 kg
coupled on plate	0.05 kg	0.02 kg	0.5 kg
Min. thickness of sample			
uncoupled	25 mm	15 mm	70 mm
coupled	3 mm	1 mm	10 mm
surface layer thickness	0.8 mm	0.2 mm	
Indentation size on test surface			
with 300 HV, 30 HRC			
diameter	0.54 mm	0.38 mm	1.03 mm
depth	24 µm	12 µm	53 µm
with 600 HV, 55 HRC			
diameter	0.45 mm	0.32 mm	0.9 mm
depth	17 µm	8 µm	41 µm
with 800 HV, 63 HRC			
diameter	0.35 mm	0.30 mm	
depth	10 µm	7 µm	



Test Blocks

EQUOTIP® Test Blocks with MPA-Certificate

Test Blocks D/MPA, G/MPA, E/MPA and S/MPA are calibrated in accordance with the dynamic hardness value L by Proceq SA and to the static hardness value of Rockwell (HRC) or Brinell (HB) by an independent traceable laboratory. These test blocks are supplied with 2 separate certificates - a certificate to the EQUOTIP-L-value (Proceq SA) and a certificate to Brinell or Rockwell C (MPA). Type, identification, reference values etc. are engraved on the test blocks see examples below.

Test Block	Impact device calibrated with	Also suitable for use with	Other scales on test block
D MPA calibrated ca. 765 LD /55 HRC Part no. 350 01 139	D/ DC	DL C E S	HRC
G MPA calibrated ca. 572 LG / 340 HB Part No. 350 08 009	G	D	HBW 5/750 (F=30D ²)
E Only available as MPA calibrated ca. 813 LE / 64 HRC Part No. 350 01 135	E	Not applicable	HRC
S Only available as MPA calibrated ca. 876 LS / 64 HRC Part. No. 350 01 125	S	Not applicable	HRC



EQUOTIP® Test Blocks calibrated by Proceq

Test Block	Impact device calibrated with	Also suitable for use with	Other scales on test block
D Proceq calibrated ca. 765 LD /55 HRC Part No. 350 01 140	D/ DC	DL C E S	HRC
G Proceq calibrated ca. 572 LG / 340 HB Part No. 350 08 008	G	D	HBW 5/750 (F=30D ²)



Ordering Information

Units

353 10 100 EQUOTIP 3 Hardness Tester, unit D

Includes :

- EQUOTIP 3 indicating device,
- AC adapter,
- EQUOTIP 3 impact device D with cable,
- test block D,
- USB-cable,
- USB-memory stick,
- cleaning brush,
- coupling paste,
- carrying case,
- support ring D6 and D6a,
- operating instructions,
- quick reference guide,
- calibration certificate



353 10 300 EQUOTIP 3 Hardness Tester, unit G

Includes :

- EQUOTIP 3 indicating device,
- AC adapter, EQUOTIP 3 impact device G with cable,
- test block G,
- support ring G6 and G6a,
- carrying case,
- USB-cable,
- USB-memory stick,
- cleaning brush, operating instructions,
- quick reference guide, calibration certificate

353 10 050 EQUOTIP 3 Hardness Tester, basic unit

Includes

- EQUOTIP 3 indicating device, AC adapter, carrying case, USB-cable, USB-memory stick, 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. The Equotip 3 (Part No 353 10 050) basic unit is combined with impact devices and test blocks to create an Equotip 3 Hardness Tester unit that meets specific measuring requirements.

Accessories

- 353 00 080 EQUOTIP 3 impact device cable 1.5 m 4-pole
- 353 00 086 EQUOTIP 3 impact device extension cable 5 m 4-pole
- 350 00 083 Impact device cable existing EQUOTIP 2 impact device to new EQUOTIP 3 display device
- 353 00 084 Impact device cable new EQUOTIP 3 impact device to existing EQUOTIP 2 display device
- 351 90 018 USB cable, 1.8m
- 350 00 082 EQUOTIP 3 RS 232 adapter cable for connection to printer
- 353 00 029 Rechargeable EQUOTIP 3 battery
- 353 00 085 AC-adapter
- 353 99 011 Equotip 3 carrying case with cut-out for test block (except G) and accessories
- 353 00 037 Equotip 3 neck / wrist strap
- 350 01 009 Support ring D6
- 350 01 010 Support ring D6a
- 350 08 004 Support ring G6
- 350 08 005 Support ring G6a
- 350 03 000 Set of support rings (12 pcs.)
- 350 01 015 Coupling paste
- 350 01 008 Cleaning brush D
- 350 01 006 Cleaning brush G

