

# 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

## proceq

... more than 50 years of know-how you can measure!

## 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)

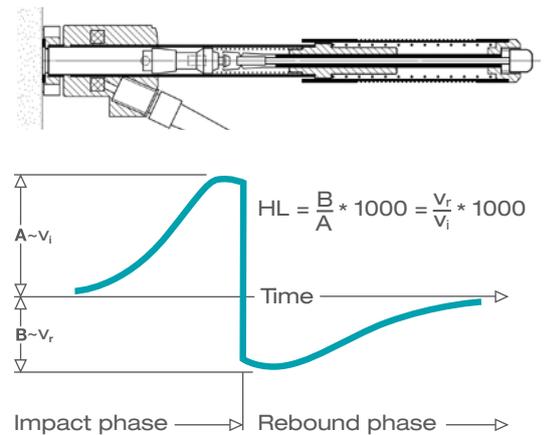
## Primary Industries

- 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<br>3 mm        |
| D    | 353 00 100  | Most widely used probe. For the majority of testing applications.   | 11 Nmm        | Tungsten carbide<br>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<br>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<br>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<br>3 mm |
| G    | 353 00 300  | Increased impact energy. Solid components, e.g. heavy-duty casts and forged parts.  | 90 Nmm        | Tungsten carbide<br>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<br>3 mm                |

## Equotip 3 Measuring Range

| Fields of application                |                                |            | D/DC     | DL       | S        | E        | G        | C        |
|--------------------------------------|--------------------------------|------------|----------|----------|----------|----------|----------|----------|
| 1 Steel and cast steel               | Vickers<br>Brinell<br>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<br>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   |
|                                      |                                | $\sigma_1$ | 275-2194 | 275-2297 | 340-2194 | 283-2195 | 305-2194 | 275-2194 |
|                                      |                                | $\sigma_2$ | 616-1480 | 614-1485 | 615-1480 | 616-1479 | 618-1478 | 615-1479 |
|                                      |                                | $\sigma_3$ | 449-847  | 449-849  | 450-846  | 448-849  | 450-847  | 450-846  |
| 2 Cold work tool steel               | Vickers<br>Rockwell C          | HV         | 80-900   | 80-905   | 104-924  | 82-1009  |          | 98-942   |
|                                      |                                | HRC        | 21-67    | 21-67    | 22-68    | 23-70    |          | 20-67    |
| 3 Stainless steel                    | Vickers<br>Brinell<br>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<br>Vickers<br>Rockwell | HB         | 90-664   |          |          |          | 92-326   |          |
|                                      |                                | HV         | 90-698   |          |          |          |          |          |
|                                      |                                | HRC        | 21-59    |          |          |          |          |          |
| 5 Cast iron, nodular graphite GGG    | Brinell<br>Vickers<br>Rockwell | HB         | 95-686   |          |          |          | 127-364  |          |
|                                      |                                | HV         | 96-724   |          |          |          |          |          |
|                                      |                                | HRC        | 21-60    |          |          |          |          |          |
| 6 Cast aluminium alloys              | Brinell<br>Vickers<br>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<br>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<br>D, DC, DL, E, S       |  |  | C | G |
|------------------------------------|---|--|--|---|---|
| <b>Preparation of the surface</b>  |   |  |  |   |   |
| Roughness class ISO                | N7                                      | N5                                       | N9                                       |   |   |
| Max. roughness depth $R_t$         | 10 $\mu\text{m}$ / 400 $\mu\text{inch}$ | 2.5 $\mu\text{m}$ / 100 $\mu\text{inch}$ | 30 $\mu\text{m}$ / 1200 $\mu\text{inch}$ |   |   |
| Centre line average CLA, AA, $R_a$ | 2 $\mu\text{m}$ / 80 $\mu\text{inch}$   | 0.4 $\mu\text{m}$ / 16 $\mu\text{inch}$  | 7 $\mu\text{m}$ / 275 $\mu\text{inch}$   |   |   |
| <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<br>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 $\mu\text{m}$ / 960 $\mu\text{inch}$ | 12 $\mu\text{m}$ / 480 $\mu\text{inch}$ | 53 $\mu\text{m}$ / 2120 $\mu\text{inch}$ |   |   |
| <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 $\mu\text{m}$ / 680 $\mu\text{inch}$ | 8 $\mu\text{m}$ / 2560 $\mu\text{inch}$ | 41 $\mu\text{m}$ / 1640 $\mu\text{inch}$ |   |   |
| <b>with 800 HV, 63 HRC</b>              |   |   |  |   |   |
| diameter                                | 0.35 mm / 0.013                         | 0.30 mm / 0.011 inch                    |  |   |   |
| depth                                   | 10 $\mu\text{m}$ / 400 $\mu\text{inch}$ | 7 $\mu\text{m}$ / 280 $\mu\text{inch}$  |  |   |   |

## 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)

## 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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