Equotip Piccolo

The Equotip Piccolo is a revolutionary portable rebound hardness tester for precise measurements on most metals.

It integrates the display and a patented mechanism in one device where the impact body type D is launched and loaded for the next test in a single motion!

The Piccolo is designed and manufactured with the quality and precision that is expected from Proceq's Equotip product family and will comply even with the roughest manufacturing environments.

The basic kit comes with the bundle of the Piccolo device and Piccolink PC software, permitting full communication between tester and PC via USB.

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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

- Scratch proofed anodized aluminum housing - rugged and durable, compact in size at just 147.5 x 44 x 20 mm
- The large bright LCD display and the 3-button keypad allow easy readings and simple device control
- Rapid reload and trigger mechanism and automatic correction for impact direction
- Wide measurement range on most common hardness scales (HV, HB, HRC, HRB, HS, Rm)
- The user may upload and use custom conversions for uncommon alloys
- Internal, non-volatile data storage of 2'000 readings complete with tagging of important information like day, time, and detailed measurement statistics
- Intelligent on/standby power switching for optimum battery charge life
- Bidirectional USB communication enables remote control from the PC and allows free and easy updates of the instrument and Piccolink software via internet.

Applications

- On-site testing in metal production and processing
- Excellent for material selection, acceptance and quality control tests
- Great also for production level testing on heavy and big parts
- Handy for difficult to access or confined test locations, also curved sample surfaces.

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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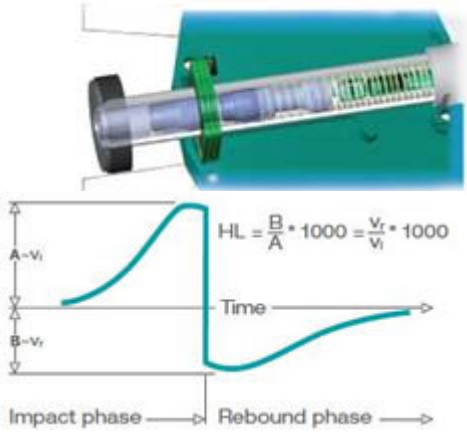
The EQUOTIP measuring principle

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 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.



The EQUOTIP hardness scale “HL”

The hardness value HL was first introduced into measuring technology in 1975, when the method and the instrumentwere presented by its inventors Leeb and Brandestini (Swiss Patent 596550). The ratio between rebound velocity vrand impact veolocity vi multiplied by 1000 is taken to calculate the hardness value HL (HL = hardness in LEEB units). Method and instrument are named EQUOTIP derived from Energy QUOtient recalling the principle of energy measurement.The PICCOLO is the latest tester in the tradition of the EQUOTIP System.

Hence, HL is a direct, standardized (ASTM A956) measurement of hardness. In contrast to static hardness testing,dynamic hardness test results contain additional information on reactive behavior of materials, e.g. on elasticproperties of the material. Correlations to other hardness scales like Rockwell C (HRC) or Brinell (HB) are available and programmed as a standard feature in the PICCOLO. Converted values can be directly displayed on the large LCD. As conversions between different hardness scales are always material dependent and affected by some loss inaccuracy, an extensive set of material specific conversions are available. With the PICCOLO the user can easilyprogram his “company’s own” conversions for those alloys and materials not included in the standard list by using industry accepted empirical tests.

	Vickers	Brinell	Rockwell		Shore	Tensile strength
Material Group	**HV**	**HB**	**HRC**	**HRB**	**HS**	**N/mm2**
1 steel and cast steel	81-955	81-654	20-68	38-100	30-100	274-2193
2 cold work tool steel	80-900		21-67			
3 stainless steel	85-802	85-655	20-62	47-102		
4 cast iron lamellar graphite GG	90-698	90-664	21-59			
5 cast iron nodular graphite GGG	96-724	95-687	21-61			
6 cast aluminum alloys	22-193	19-180		24-85		
7 copper/zinc alloys (brass)		40-173		14-95		
8 CuAl/CuSn alloys (bronze)		60-290				
9 wrought copper alloys, low alloyed		45-315				

Testing with EQUOTIP PICCOLO- Easy as 1-2-3


1. Place


2. Load


3. Measure

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1. Place the PICCOLO on the surface point to be tested, perpendicular to the surface.
   Recommendation: grasp the PICCOLO between the housing and the support ring and press firmly against the surface.
2. Loading the impact device – slide the actuator towards the housing. The catch chuck grasps the impact body and draws it against the energy spring to a defined force. This motion “wakes up” the electronics and the display shows the current test settings.
3. Measuring is accomplished by again sliding the actuator towards the housing. This releases the impact body from the catch chuck and propels it towards the test surface within the defined energy. Results are immediately displayed in the selected scale. No separate trigger action is necessary – loading and release is accomplished in the same motion.
   Recommendation: space the impacts 3 mm to 5 mm apart, and average 3 to 5 single values for each data point.

Suitable test specimens are primarily large, massive parts. Owing to the dynamic mode of action, it should be ensured that the specimen does not move or oscillate during the measurement. Parts which are too thin or thinly coated need special effort to assure reliable results. The measured surface must be clean and dry. Surface roughness should be betterthan ISO N7. Excessive scattering of test result indicates poor surface preparation.

Preparation of the surface	
Roughness class	ISO N7
Max. roughness depth Rt	10 µm
Centre line average CLA, AA, Ra	2 µm
Min. weight of samples	
of compact shape	5 kg
on solid support	2 kg
coupled on plate	0.1 kg
Min. thickness of sample	
uncoupled	25 mm
coupled	3 mm
surface layer thickness	0.8 mm

Max. hardness of samples	
890 HLd (955 HV, 68 HRC)*	
Indentation size on test surface	
with 570 HLd (300 HV, 30 HRC)*	
diameter	0.54 mm
depth	24 µm
with 760 HLd (600 HV, 55 HRC)*	
diameter	0.45 mm
depth	17 µm
with 840 HLd (800 HV, 63 HRC)*	
diameter	0.35 mm
depth	10 µm

* approximate hardness conversion for steel

Configuring the EQUOTIP PICCOLO

The display output of your test results (scale and material) can be configured individually by the 3 button on-board control system or via the PC interface program. Basic statistic option, <cancel> for last test value and check of hardware features make the PICCOLO ready for maximum ease of customized use. Sensing and compensation for impact direction is default, but can also be switched off.

EQUOTIP PICCOLO full bi-directional communication

The PICCOLO is supplied with special interface software to facilitate communication with Windows®-based computers. This easy to use software assists in managing the stored data for further evaluation. Data can be assessed within the software, or exported for use in other data evaluation programs. The software can also be used to fullymanage the set-up of the PICCOLO via the USB port. The firmware of the PICCOLO can be easily updated from the Proceq web-site to the latest version through this software.

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Technical Specifications

Dimensions	147.5 X 44 X 20 mm
Weight	110 g
Impact Energy	11 mJ (11 Nmm)
Impact Body D	5.5 g
Spherical Test Tip	Ø 3 mm, Tungsten Carbide (ca. 1500 HV)
Measurement Range	150 - 950 HL
Conversions	81 - 955 HV, 81 - 678 HB, 20 - 70 HRC, 38 - 102 HRB, 30 - 100 HS, 274 - 2193 N/mm^2
Resolution	1 HL, 1 HV, 1 HB, 0.1 HRC, 0.1 HRB, 0.1 HS, 1 N/mm^2
Impact Direction	Automatic Sensing and Compensation (Fine Angular Resolution)
Measurement Accuracy	±4 HL (0.5% At 800 HL)
Operating Environment	-10 to +60 °C, 90% Max. Humidity
Construction	Scratch Proofed Anodized Aluminum
Display	Large, High Contrast LCD
Battery	Li-Ion, Charges from USB Port
Battery Life	Over 20,000 Impacts on a Full Charge
On/Off	Automatic, Using Intelligent Wake-Up/Sleep Mode
Internal Memory	2,000 Readings, Non Volatile Memory (Optional Extension of Memory Capacity)
Communications	USB, Bi-Directional with PC Interface Software
Operator Lock	Programmable from PC Interface Software

Unit Kits

351 10 001 **EQUOTIP PICCOLO** hardness tester, unit D
Includes: PICCOLO hardness test device with impact body D, small D6a and large D6 support ring, cleaning brush, charger and USB cable, neck/wrist strap (lanyard), USB-memory stick with Software, device box, operating instructions, quick reference guide, product certificate

351 10 002 **EQUOTIP PICCOLO** hardness tester, unit D with Proceq test block
Includes: 351 10 001, test block D with Proceq calibration, large carrying case

351 10 003 **EQUOTIP PICCOLO** hardness tester, unit D with MPA certificate
Includes: 351 10 001, test block D with MPA calibration and certificate, large carrying case

Optional Accessories

350 01 140 Test block D with Proceq calibration
350 01 139 Test block D with MPA calibration and certificate
351 90 001 Large carrying case with space for test block and major accessories
350 01 015 Coupling paste (can)
350 03 000 Set of support rings (12 pcs.)
351 90 003 AC charger/power supply (110-220 V)
820 35 101 Operating instructions
820 35 102 Quick reference guide

Replacement Parts

351 01 001 PICCOLO hardness test device, with impact body and support ring D6
351 90 021 PICCOLO hardness test device (exchange), with support ring D6, without impact body
350 01 004 Impact body D*
350 01 009 Support ring D6* (19,5 x 5,5 mm)
350 01 010 Support ring D6a* (13,5 x 5,5 mm)
351 90 019 Device box
351 90 016 Neck/Wrist strap (Lanyard)
351 90 018 USB cable, 1.8 m
351 90 017 Cover for USB receptacle
350 01 008 Cleaning brush
341 80 112 USB charger

* wear and tear items

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