equotip
piccolo 2
bambino 2

From the Inventor of the revolutionary Portable Hardness Tester "Equotip"

The new Equotip Piccolo 2 / Bambino 2 with patented single loading-release mechanism.

Only from Proceq! interchangeable D / DL probes

Piccolo 2: For real-time monitoring and user specific conversions

Application Example 1: Metal heat treatment allows mechanical properties to be changed so that the metal will be harder, stronger and more resistant to impact. The Piccolo 2 is used to monitor and document the strengthening of high integrity metal components for the automobile industry.

"We have been using Equotip for many years, but this application is the first one with a real time management of the measurement data by an automated system. It also minimizes human error." QSE Manager, Saint-Jean Industries

Application Example 2: Automotive Lifting Technology are subject to stringent requirements that need to be met by an automotive lift manufacturer. The portability of the Piccolo 2 is ideal for testing bulky lift components.

"The device is very easy to use with diverse applications. Data transfer connection with the PC can be established quickly, making the Piccolo 2 ideal for our applications in automotive lifting". Quality Manager, Blitz Rotary

Bambino 2: For quick on-site hardness checks

Application Example 1: Scuffing can lead to catastrophic failure in engineering components. E.g. in turbines of power plants where wearable parts are required to endure high mechanical stress. The Bambino 2 with the DL probe can be used to ensure that stressed recesses, joints and edges are of the correct hardness to minimize scuffing.

"The high repeatability of measurements singles out Equotip from competitor products. The Bambino 2 offers accessibility to constricted spaces on studs through the slim DL tip". Voith Siemens Hydro Power Generation

Application Example 2: Cold rolling is often used to decrease the thickness of sheet metal. To avoid spall fracture, Equotip and Equotip's Leeb hardness unit HL are used as a standard for roll testing in rough environments. The light-weight Equotip Bambino 2 lends itself to quick intermittent checks of rolls.

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Monitoring the Hardness of Metals

Metals undergo different processes before being converted into a final product. Each process can have an effect on the mechanical and chemical attributes of metal. For example, the strength of steel is determined by its chemical composition and microstructural transformations. Macroscopic variables are used to control the final product quality. Hardness is one characteristic of metal that can be easily monitored. In 1975, Proceq invented the revolutionary portable metal hardness tester “Equotip”. The standardized Leeb principle, also invented by Proceq, makes measuring metal hardness very simple. The Equotip Piccolo 2 / Bambino 2 continue Proceq's fine tradition of inventing best-in-class products.

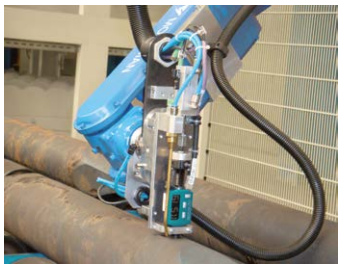
The Differences between Piccolo 2 and Bambino 2

The Equotip Piccolo 2 and Bambino 2 are both suited for on-site hardness checks of metals where the test indentation should be as small as possible. The robust design and large display allow the user to work at dusty worksites with low visibility. Both products also display metal hardness in all common scales.

The Equotip Piccolo 2 offers the same features as the Equotip Bambino 2, but has the following additional features:

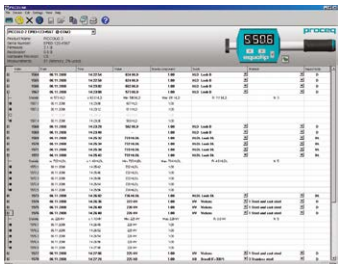
1) user defined hardness conversions
2) Piccolink software for:
    a) systematic real-time monitoring of hardness
    b) automated testing during serial production
    c) evaluation and processing of measured data
    d) remote controlling of Piccolo 2 settings

Equotip Piccolo 2 and Bambino 2 are supplied with a D impact device. It can be interchanged with an optional DL impact device, which is useful for measurements in restricted areas.



Equotip Piccolo 2

Equotip Bambino 2



Piccolink software

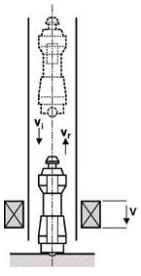
Essential Equotip Requirements

Surface preparation of the sample	
Roughness class ISO	N7
Maximum roughness depth Rt	10 µm
Centre line average Ra, CLA, AA	2 µm
Indentation on sample at 760 HLD (600 HV, 55 HRC)	
Diameter	0.45 mm
Depth	17 µm

Minimum weight of sample	
Compact sample shape	5 kg
Sample on solid support	2 kg
Sample coupled to solid support	0.1 kg
Minimum thickness of sample	
Uncoupled / Coupled	25 mm / 3 mm
Surface layer thickness	0.8 mm

Leeb Rebound Principle of Equotip Hardness Testers

The portable hardness testers used most commonly for metals are based on the Leeb rebound method invented by Proceq SA. The Equotip Piccolo 2 / Bambino 2 operate according to the Leeb principle, in which the hardness value is calculated from comparing the energy of a test body before and after impacting on a sample. This Energy QUOtient (EQUO) is quoted in the hardness unit HL and is calculated from comparing the impact and rebound velocities (v_i , v_r) of the impact body. It rebounds faster from harder samples than from softer ones, resulting in a greater energy quotient which is defined as $1000 \cdot v_r / v_i$.



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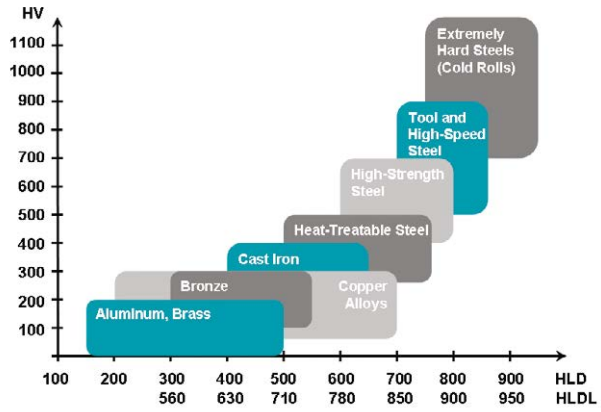
Immediate Conversion to established Metal Hardness Scales



Metal hardness can be displayed in different hardness scales: HL (Leeb), HRC (Rockwell C), HB (Brinell), HV (Vickers) and so forth. The Equotip Piccolo 2 / Bambino 2 enables measurements to be rapidly taken and displayed in any chosen hardness scale.

The Equotip Piccolo 2 has an additional feature that lets the user customize conversion curves for special alloys and also allows the user to convert hardness readings into tensile strength.

Key Accessories

Equotip DL Accessory Kit - This is a unique feature offered by Proceq. It allows the user of a Piccolo 2 / Bambino 2 to quickly and easily interchange the D and DL impact devices.

Test Blocks - It is necessary to regularly conduct 3 to 10 test impacts on a reference hardness object to verify the correct operation of the Equotip device. Various test blocks are available depending on the users' hardness requirements. For added convenience, the test blocks also indicate the reference hardness value in different hardness scales.

Support Rings - Leeb rebound testers only work correctly when the impact body is held at a proper distance from the test surface during impact. The wide range of support rings permits testing on a great variety of part geometries, i.e. flat surfaces, concave or convex cylindrical surfaces, spherical test surfaces.

Technical Specifications

	With Impact device D	**With Impact device DL**
Measuring range	150-950 HLD	250-970 HLDL
Instrument dimensions	147.5 x 44 x 20 mm (5.71 x 1.75 x 0.79 inches)	203 x 44 x 20 mm (7.99 x 1.75 x 0.79 inches)
Instrument weight	142 g (5 ounces)	152 g (5.4 ounces)
	General Specifications (applicable to both Equotip Piccolo 2 and Equotip Bambino 2)	
Conversions	80-955 HV, 81-678 HB, 20-70 HRC, 38-102 HRB, 30-100 HS (Equotip Piccolo 2 only: 274-2193 N/mm^2)	
Resolution	1 HLD / HLDL, 1 HV, 1 HB; 0.1 HRC, 0.1 HRB, 0.1 HS (Equotip Piccolo 2 only: 1 N/mm^2 Rm)	
Measuring accuracy	± 4 HLD / HLDL (0.5% at 800 HLD / HLDL)	
Maximum test hardness	890 HLD (955 HV, 68 HRC)	
Impact direction / energy	Automatic compensation / 11 Nmm	
Ball indenter	Tungsten carbide (approx. 1'500 HV), 3 mm (0.12 inches) diameter	
Housing	Scratch-proof, hard-coated zinc alloy	
Battery	Rechargeable Li ion, operation period over 20'000 impacts, charging current 100 mA	
Integrated memory	Non-volatile, RAM 32 kBytes, ~ 2'000 measured values (Equotip Piccolo 2 only)	
Operating conditions	Temperature: -10 to +60 °C (14 to 140 °F), Humidity: 90% max.	
IP classification	IP52	

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