

EPX300 Portable Hardness Tester



CONTENTS

- 1 Introduction
 - 1.1 Principle
 - 1.2 Structure
 - 1.3 Specifications

- 2 Test
 - 2.1 Preparation
 - 2.2 Test Procedure
 - 2.3 Browse
 - 2.4 Printing
- 3 Setup
 - 3.1 Material
 - 3.2 Direction
 - 3.3 Scale

- 3.4 Clock

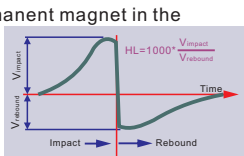
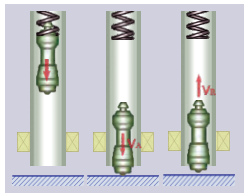
- 4 Maintenance
 - 4.1 Routine Maintenance
 - 4.2 Calibration
 - 4.3 System Reset

- Appendix
 - A-1 Hardness Conversion
 - A-2 Tensile Strength Conversion

1 Introduction

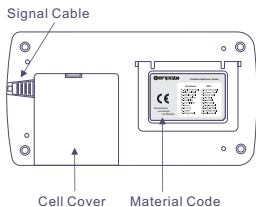
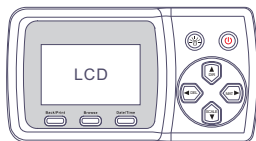
1.1 Principle

The tester measuring principle is physically a rather simple, dynamic hardness tester. 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. The 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.

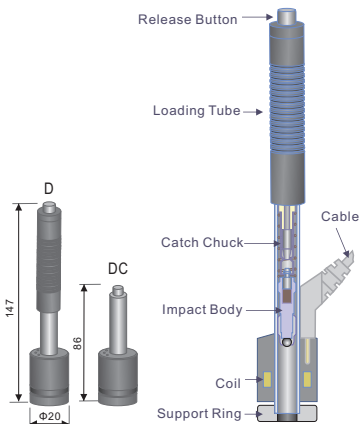


1.2 Structure

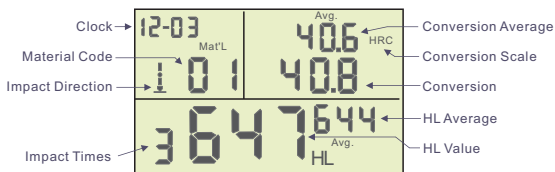
1) Display Unit



2) Impact Device



3) Display



4) Keypad

Back/Print

- ❶ In measurement mode, press and hold it to erase the measured data. Or if the mini-printer is linked with the display unit, it will print out those data.
- ❷ In other mode, press it to complete setup and save the parameters and return to the measurement mode.



- Pressing and holding to turn on/off power.



- Turn on/off the LCD backlight

Browse

Browse data in memory

Date/Time

Adjust date and time.



- ❶ In measurement mode, press it to setup the impact direction.
- ❷ In Date/Time setup mode and calibration mode, press it to increase the flickering bit.
- ❸ In browse mode, press it to display the previous data.



- ❶ In measurement mode, press it to select the material.
- ❷ In Date/Time setup mode and calibration mode, press it to select the next bit.



- ❶ In measurement mode, press it to setup the conversion scale.
- ❷ In Date/Time setup mode and calibration mode, press it to decrease the flickering bit.
- ❸ In browse mode, press it to display the next data. measurement mode or browse mode.



- Press and hold it to delete current data in measurement mode or browse mode.



1.3 Specifications



- **Display Range:** 0 ~ 999HLD
- **Accuracy:** ± 6 HL(at 800HLD)
- **Resolution:** 1 (HL,HV,HB, HSD , MPa); 0.1(HRC,HRB)
- **Impact Energy:** 11 Nmm
- **Mass of Impact Body:** 5.5g
- **Test Tip:** $\Phi 3$ mm tungsten carbide ball
- **Power:** 3 *1.5V AAA Batteries
- **Operating Temperature:** 0°C~+50°C (32°F~122°F)
- **Storage Temperature:** -10°C~+60°C (14°F~140°F)
- **Dimensions:** 150*80*24mm(Display unit), Impact length
- **Weight:** Approx.200g(display unit)
Impact device 75g(Type D), 50g (Type DC)
- **Conforms to Standard:** ASTM A956 & DIN50156

2 Test

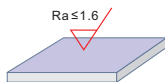
2.1 Instrument preparation

- ① Install the battery
- ② Connect impact device
- ③ Turn on the power
- ④ To confirm the accuracy: Use the standard test block to check the tester and make sure it work well.

2.2 Specimen preparation

Inappropriate specimen will bring the error measured results. It should be the necessary processing and preparation according to the original conditions of specimen. The preparation of specimen shall be annexed the basic requirements for the following:

- ① In the test surface preparation, should be avoided cold, heat processing on the specimen surface.
- ② Test surface should be flat with metallic luster, and no oxide skin and other dirt.
- ③ The roughness of test surface should be $Ra \leq 1.6$.

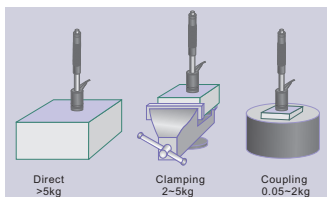


- ④ The specimen must be of sufficient mass and rigidity to avoid the displacement or move in test.

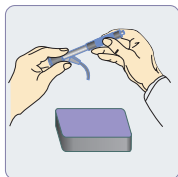
Generally, the mass of the specimen is greater than or equal to 5kg can be carried out the test directly.

The specimen of 2 ~ 5kg need to be clamped to fix, the specimen of 0.05 ~ 2kg should be coupled. If the mass is lighter than 0.05kg, it is unfavorable to Leeb test type D.

- ⑤ The thickness of specimen shall be not less than 5mm, and thickness of homogeneous layer (or surface hardening layer) is not less than 0.8mm.
- ⑥ If the test surface is not flat, the radius of test area should be larger than 30mm. And should mount a appropriate supporting ring.
- ⑦ The specimen should not be with magnetic.

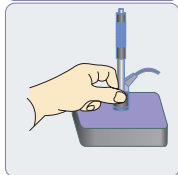


2.3 Test Procedure



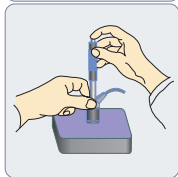
1) Loading

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



2) Locating

Then place and hold the impact device on the surface of the test piece at the desired test point. Impact indirection should be vertical with the test of surface.

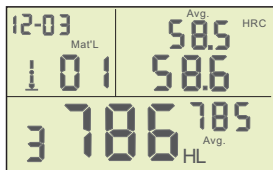


3) Impacting (Measuring)

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

4) Read test result

Read out the test result from LCD.



Hardness value: 786HLD;

The 3rd measurement point;

Mean value: 785HLD

Material Code: "01" (Steel & Casting Steel)

Conversions to HRC: 58.6HRC

Mean value of HRC: 58.5HRC

Note:

Generally, each measurement location of sample is conducted for the five tests. The distance between any two impact point should be ≥ 3 mm ; the distance between impact position and the edge of the sample should be ≥ 3 mm.

2.4 Browse

The tester can save 9 hardness values, you can browse them after testing.

Press **Browse** button to browse stored data and display the first data in last nine test data, including hardness value HLD, material code, conversion, impact direction, date and time etc.

Press **UP** or **SCALE** button to browse the next or previous data group.
Press **Back/Print** button back to the measurement mode.

2.5 Print Test Report

The tester can be linked to a wireless printer to print a report.

Place the printer near the tester(within 2 m), and turn it power on.

Press **Back/Print** for about 2 seconds, a report will be printed.

NOTE:

The original data in memory will be erased automatically when the print completed.

Test Report	
Impact Unit Type: D	
Material: Steel & Cast steel	
1 782 HLD	58.3 HRC
2015-12-03 15:21	
2 787 HLD	58.7 HRC
2015-12-03 15:21	
3 786 HLD	58.6 HRC
2015-12-03 15:22	
4 785 HLD	58.5 HRC
2015-12-03 15:23	
5 784 HLD	58.4 HRC
2015-12-03 15:23	
S= 5 HLD 0.4 HRC	
X=785 HLD 58.5 HRC	
2015-12-3 15:25	

3 Setup

3.1 Material Code

In measurement mode, press **MAT** button to select the material code you will test. The material code is listed on the back label

Note:

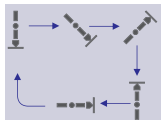
It is necessary to select the material classification. When you did not know the material type, you should reference the related material handbook.

Hardness	MPa
01. Steel & Cast Steel	11.Low Carbon Steel
02. Alloy Tool Steel	12.Hi Carbon Steel
03. Stainless Steel	13.Chrome Steel
04. Grey Cast Iron	14.Cr-V Steel
05. Ductile Iron	15.Cr-Ni Steel
06. Cast Al Alloys	16.Cr-Mo Steel
07.Brass	17.Cr-Ni-Mo Steel
08.Bronze	18.Cr-Mn-Si Steel
09. Copper	19.Hi Strength Steel
10. Forging Steel	20.Stainless Steel

3.2 Impact Direction

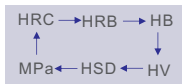
In measurement mode, press **DIR** button to select the impact direction.

The tester can do some correction for test directions automatically.



3.3 Scale

In measurement mode, press  to convert to the other hardness scales or tensile strength (MPa).



Notes:

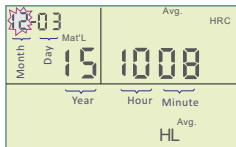
- A) The conversion value is “---” indicated the conversion is out of range.
- B) When you set the conversion from hardness scale to tensile strength or from tensile strength to hardness scale, you must be reset the material group.
- C) Conversion value only supplies the general reference, which may result in some offset. Precisely conversion generally needs related comparative tests.

3.4 Clock

The Hardness Tester has built-in real-time clock system.

It must be adjusted when you reinstall the batteries or other necessary case.

Press  to enter the clock adjustment mode.



Press  or  to change the value and press  to move item.

Press  to confirm the set and back to measurement mode.

4 Maintenance

4.1 Routine maintenance

1) General considerations

Impact device should avoid collision, the weight stack in the use and storage. Put into the case after use. The impact body should be in release state when storage.

Should avoid close to the strong magnetic. Any of the components can't stick any kinds of oil or lubricant.

2) Clean the impact body

General every 1~2 thousands of times after test, the impact device tube and impact should be cleaned up.

Method: Rotate off the support ring, release and remove the impact body. use the nylon brush to clean up the tube and impact body.

3) Replacement impact ball

For long-term use, the impact ball may be worn, it should be replaced when affect the test precision.

4.2 Calibration

The calibration can be done in any scale (HLD, HRC, HRB, HB, HV, HSD), so as to farthest decrease the measuring error.

Before calibration, the scale should be converted into the scale needed. Such as to calibrate in HB, "HB" should be selected by press  button.

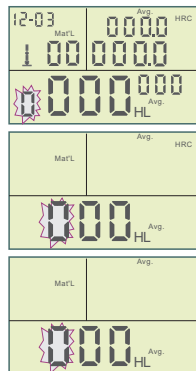
① Press  button for about 2 seconds until the number of impact times flicker that the impact time become to "0".

② Test 5 times on test block to obtain the average value (can delete some error data in operation).

③ Press and hold  button about 2 seconds to display the calibration mode.

④ Enter the standard value of test block.

Press  or  to change the value and press  or  to move digit.



Note:

A) If calibration in the other scale(HRC, HRB, HB, HV or HSD), the scale must be adjusted in measurement mode first.

B) In the other scale (HRC, HRB, HB, HV, HSD) calibration mode, the standard values input is different from calibration in Leeb hardness(HL).

25.0HRC, should be entered into "250" (HRB is the same).

85HB, should be entered into "085"(HV, HSD are the same).

If the input data exceeds the range, the calibration will not be performed.

**25.0HRC, should be entered into "250" (HRB is the same).
 85HB, should be entered into "085" (HV, HSD are the same).
 If the input data exceeds the range, the calibration will not be performed.**

4.3 System Reset

If the display unit isn't working properly or halt, you should reset system.
 Replace the batteries and remount them , then turn on the power.

Appendix

A-1 Hardness Scale Conversion Range

Materials	HV	HB	HRC	HRB	HSD
Steel & Cast Steel	81-955	81-654	20.0-68.4	38.4-99.5	32.5-99.5
Alloy Tool Steel	80-898		20.4-67.1		
Stainless Steel	85-802	85-655	19.6-62.4	46.5-101.7	
Grey Cast Iron		63-336			
Ductile Iron		140-387			
Cast Aluminum Alloy		19-164		23.8-84.6	
Brass		40-173		13.5-95.3	
Bronze		60-290			
Copper		45-315			
Forging Steel	83-976	142-651	19.8-68.5	59.6-99.6	26.4-99.5

A-2 Tensile Strength Conversion Range

Materials	Tensile Strength (MPa)
Low Carbon Steel	375-788
Hi-Carbon Steel	774-1710
Chrome Steel	742-1845
Cr-V Steel	736-2026
Cr-Ni Steel	782-2058
Cr-Mo Steel	747-1888
Cr-Ni-Mo Steel	850-1947
Cr-Mn-Si Steel	781-2045
Hi-Strength Steel	1170-2693
Stainless Steel	740-1725