PORTABLE HARDNESS TESTER

- Wide measuring range
- Hardness reading in split seconds
- For all metallic materials
- Measures in any direction
- Data transfer to PC/printer
- High accuracy ±4HL (0.5% at 800 HL)
- Instant digital display of hardness value

Application Range - Primary Industries
- 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
- Compensation for impact direction
- Excellent for material selection and acceptance tests
- Easy to use and accurate on curved test surfaces (R > 10 mm)
- Metal production & processing
- Automotive & transportation
- Machinery & power plants
- Petro-chemical, refineries
- Aerospace & shipyard
- Metal constructions
- Testing services & laboratories

Standardized according to ASTM A956-96
EQUOTIP Units
all you need for quick, precise hardness measurements!

Standard Equipment D
Art. Nr. 350 01 000
Impact device D with 1.5 m cable and electronic indicating device, standard test block D, coupling paste, carrying case 325 x 295 x 105 mm, weight 4.8 kg.

In addition to universal unit D, the following units are assembled from accessory combinations.

Standard Equipment G
Art. Nr. 350 92 000
Impact device G with 1.5 m cable and electronic indicating device, standard test block G (separate), 6.1 kg carrying case 325 x 295 x 105 mm, weight 8.1 kg (6.1 kg + 2.0 kg)

This variant version is recommended for the exclusive measurement of solid and heavy components in the Brinell range. Unit G places low demands on measuring location surface finish. Typical applications: forgings or solid castings

Standard Equipment E
Art. Nr. 350 93 000
Impact device E with 1.5 m cable and electronic indicating device, standard test block E, coupling paste and carrying case 325 x 295 x 105 mm, weight 4.8 kg.

Comprises impact device E with diamond test tip for an extremely long life. Recommended where the predominant hardness values to be measured are in excess of 50 HRC, respectively 650 HV, or for extra hard components.

EQUOTIP Measuring Principle
When the test is carried out, an impact body with a tungsten carbide test tip is impelled by spring force against a test surface from which it rebounds. Impact and rebound velocities are measured by following method: a permanent magnet integrated into the impact body passes through a coil and induces an electric voltage during its forward and return travel. These voltages are proportional to the velocities and are processed and displayed as the hardness value $L$ on the indicating device.

The Hardness Value "L"
This term, 1978 introduced by Proceq into measuring technology, is the quotient for the impact body’s rebound and impact velocity, multiplied by 1000. Harder materials produce higher rebound velocity than those which are less hard.

With reference to a particular material group (e.g. steel, aluminium etc.) the $L$-value represents a direct hardness measurement and is used as such. Comparison curves with standard static hardness values have been established (Brinell, Vickers, Rockwell C) for the most prevalent materials, enabling the $L$-values to be converted into the relevant values for these procedures.

With EQUOTIP 2, such hardness values can be directly displayed in the hardness scales HRC, HB, HV and HS. Additionally, the user can input up to 20 "plant internal" conversion tables.
Performing of Hardness Test

1. Load
2. Place
3. Measure

Simple - few operating elements. Accurate measurements possible even by occasional users. Absolutely no settings required. Reliable, ultra-modern electronics, battery state indicator and automatic reading cancellation in the event of low battery. LCD display for low power consumption. Simple, instantaneous function check.

Read off the hardness value \( L \).

The instrument is immediately ready for the next impact which will erase the \( L \)-value displayed.

Technical Data Unit D

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

* Specific acceptable materials for each group available on request

Measuring ranges of the most important hardness measuring procedures in comparison to the hardness of different metals

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EQUOTIP Impact Devices

The EQUOTIP unit is fitted with universal impact device D. Special impact devices are available for use in extremely confined spaces, with special component geometry or surface finish. These significantly extend the possibilities of application for the EQUOTIP procedure. Each special impact device is compatible with unit D indicating device and is supplied as accessory.

Impact Device D
Art. No. 350 71 001
Application: For the majority of your hardness testing assignments
Weight: 75g

Impact Device G
Art. No. 350 72 001
Application: Solid components. e.g. heavy castings and forgings.
Weight: 250g

Impact Device C
Art. No. 350 75 001
Application: Surface hardened components, coatings, thin walled or impact sensitive components (small measuring indentation).
Weight: 75g

Impact Device S
Art. No. 350 71 410
Application: Big, heavy and massiv materials - extremely hard test pieces - rolls in the upper hardness range
Weight: 80g

Impact Device E
Art. No. 350 73 001
Application: For measurements in the extremely high hardness range (always in excess of 50 HRC/650 HV): Tool steels with high carbide content inclusions.
Weight: 80g

Impact Device DL
Art. No. 350 71 310
Application: For measurements in extremely confined spaces or at the base of grooves.
Weight: 100g

Impact Device DC
Art. No. 350 71 002
Application: Use in very confined spaces, e.g. in holes, cylinders or for internal measurements on assembled machines.
Weight: 50g
Operator-friendly

At a glance the large LCD monitor provides information on:
- Hardness value L (measured value)
- Lowest value (min)
- Highest value (max.)
- Range (R)
- Standard deviation (s)
- Mean value (x)
- Converted mean value
- Impact no.

Shown in the information line are the current basic settings.
In the example:
- Impact device D
- Impact direction downwards
- Mean value automatically formed after 5 individual measurements
- Conversion to HRC
- Consecutive measuring series no.

Visual representation of the last measuring series provides an immediate survey of hardness level and regularity.
Freely selectable setpoints limits.
The user can set up the EQUOTIP device to his specific requirements with a few keys.

EQUOTIP indicating device

- Supplied by 6 Nos. 1.5V Mignon cells, operating life with one set of batteries approximately 60 hours at 20°C
- Connection for standard mains supply 9 V DC, 0.2 A
- Permissible temperature range 0°C to + 50°C
- RS 232C interface
- Dimensions: 180 x 175 x 80 mm/800 g

Communications

The measured data can be transmitted via interface RS 232C to an external printer in on-line-mode. The stored data (capacity of memory approx. 5000 values) can be transferred by means of EQUOLINK-Software via RS 232C to a computer.
On curved surfaces having a radius less than 30 mm, effective positioning on the testpiece is facilitated by the use of support rings (set of 12). The appropriate support ring is screwed on to the front of the impact device. The set includes support rings for cylindrical, hollow-cylindrical, spherical or hollow-spherical surfaces with a radius of 11 mm. Special support rings can be manufactured for geometrically complex surfaces.

**Application criteria valid for impact bodys D, DC, DL, E, S**

As is standard practice for hardness measurements, the measuring location surface should be bright and smoothly ground. It does not have to be polished. Damage to the test piece surface after testing with EQUOTIP will be minimal. At least 2 to 3 test impacts should be made at each measuring location, and then in all cases the average should determine for the individual readings. A surface of 10 x 10 mm is sufficient for measurement purposes. The device can also be used without special preparation using the EQUOTIP unit D. Slim workpieces and those weighing between 2 and 5 kg must be placed on a solid baseplate for testing in such manner that the force of the impact neither shifts them nor causes them to flex, since otherwise the readings could be falsified.

Compact miniature parts with plane measuring surfaces can also be tested, but must be “coupled” for the purpose with rigid base. "Coupling" is effected by lightly coating the workpiece with coupling paste and "sticking" it firmly to a baseplate of adequate weight.