

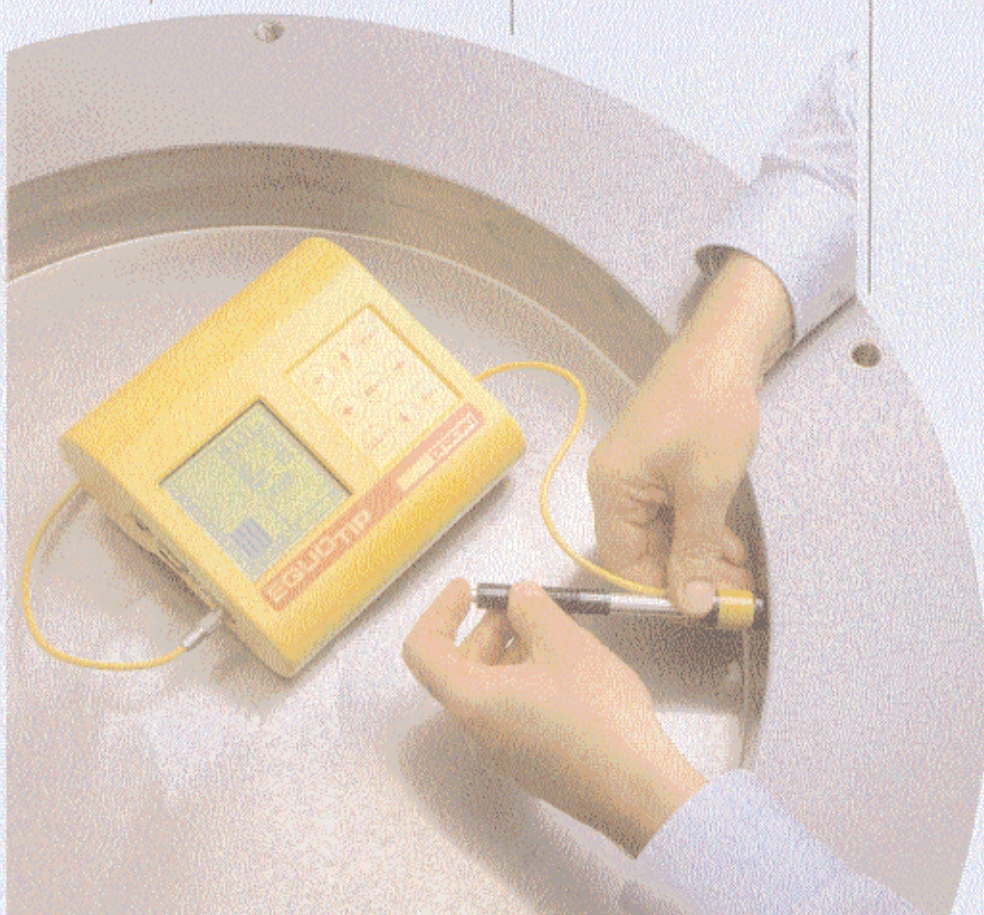
NEW

EQUOTIP 2 Hardness Tester

EQUOTIP is an extremely light-weight, portable metal hardness tester. It is based on a novel dynamic rapid test procedure.

Characteristics: a wide measuring range, high precision combined with simple handling and low test expenditure.

Conforms to the
EQUOTIP Standard
ASTM A 958 - 96



Measuring Accuracy: Mean uncertainty $\pm 0.5\%$ (referred to $L = 800$), respectively ± 4 L-units



Wide measuring range



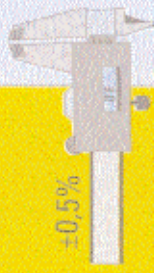
Hardness reading in split seconds



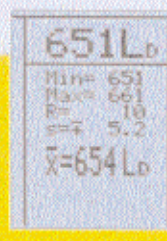
For all metallic materials



Measures in any direction



High accuracy $\pm 0.5\%$



Instant digital display of hardness value

EQUOTIP

ISO 9001

proceq

EQUOTIP Unit D

all you need for quick, precise hardness measurements!

Standard Equipment D

Impact device D with 1.5 m cable and electronic indicating device. Standard test block D. Coupling paste. Carrying case 325x295x105 mm. Weight 4.8 kg.

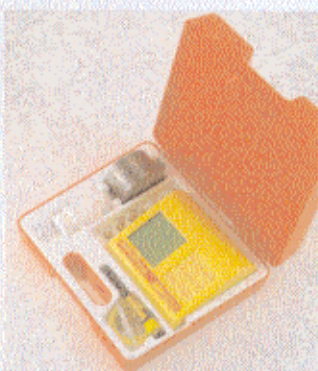
In addition to universal unit D, the following units are assembled from accessory combinations.

Unit G

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

Unit E

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 up to 1200 HV.



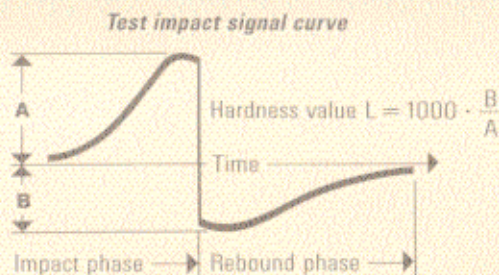
Standard Equipment G

Impact device G with 1.5 m cable and electronic indicating device. Standard test block G (separate) 6.1 kg. Carrying case 325x295x105 mm. Weight 8.1 kg (6.1 kg + 2.0 kg).

Standard Equipment E

Impact device E with 1.5 m cable and electronic indicating device. Standard test block E and coupling paste. Carrying case 325x295x105 mm. Weight 4.8 kg.

EQUOTIP Measuring Principle



L-value stands for Leeb-value, named after the inventor of the process, Dipl. Ing. Dietmar Leeb.

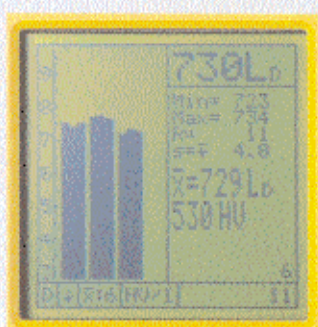
When the test is carried out, an impact body with a tungsten carbide test tip is impelled by spring force against a test surface from which it rebounds. Impact and rebound velocities are measured by the following method: a permanent magnet integrated into the impact body passes through a coil and induces 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, introduced into measuring technology in 1978, is the quotient of the impact body's rebound and impact velocity, multiplied by 1000. Harder materials produce a higher rebound velocity than those which are less hard. With reference to a particular material group (e.g. steel, aluminium etc.), the L-value repre-

sents 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, such hardness



values can be directly displayed in the hardness scales HRC, HB, HV or HS.

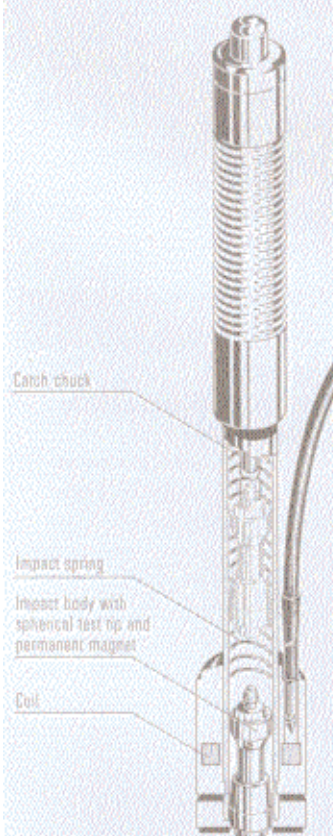
Additionally, the user can input up to 20 "plant internal" conversion tables.

ISO 9001

proceq

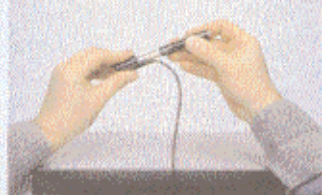
EQUOTIP

Impact device



Performing of Hardness Test

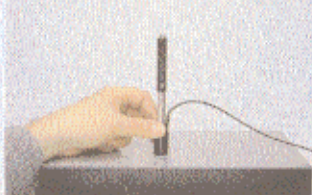
Loading by setting the spring force



Simple – few operating elements. Accurate measurements possible even by occasional users. Absolutely no settings required.

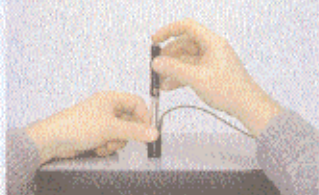
Reliable, ultra-modern electronics, battery state indicator and automatic reading cancellation in the event of low battery. LCD display for low power consumption. Simple, instantaneous function check.

Place impact device in position



No subjective measuring errors are possible. Readings are available for automatic processing or printout.

Trigger the impact



Read off the hardness value L



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

Technical Data

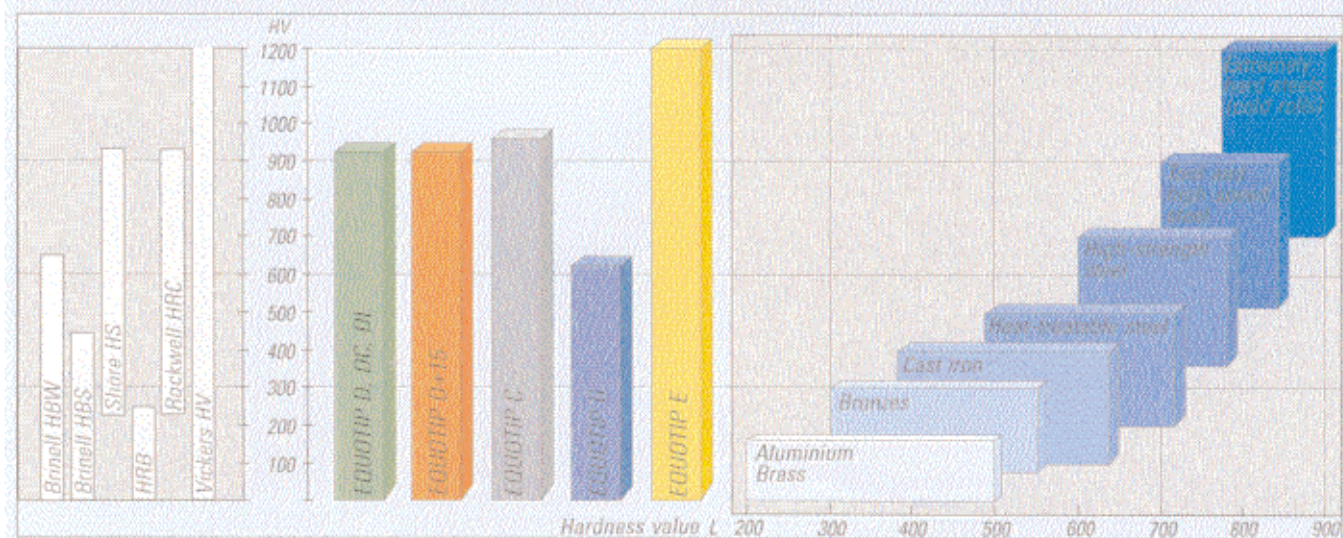
EQUOTIP Unit D

| Range of measurements* | L value range | Equivalent static hardness |
|------------------------|---------------|----------------------------|
| Steels | 300-800 | 80-654 Brinell |
| | 300-890 | 80-955 Vickers |
| | 510-890 | 20- 68 Rockwell C |
| Aluminium castings | 200-560 | 30-164 Brinell |
| Cast iron | 360-660 | 90-664 Brinell |
| Brass | 200-550 | 40-173 Brinell |
| Copper wrought alloys | 200-690 | 45-315 Brinell |

* The ranges are stipulated by the application limits of the relevant static procedure. Applicable for EQUOTIP D: The test object hardness is not to exceed 940 HV, respectively 68 HRC.

Measuring ranges of the most important hardness measuring procedures

in comparison to the hardness of different metals



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.

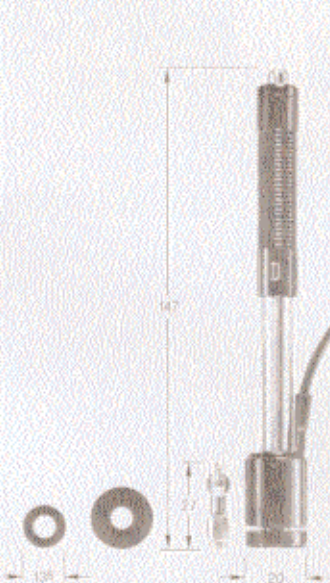
Impact Device G

Special feature: Enlarged test tip, increased impact energy (approx. 9 times that of type D). Low demands on measuring surface finish. For measurements in the Brinell range only (max. 650 HB).
Application: Solid components, e.g. heavy castings and forgings.
Weight: 270 g



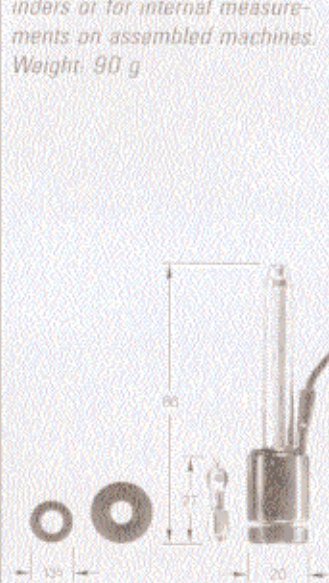
Impact Device D

Special feature: Universal standard unit. For the majority of your hardness testing assignments.
Weight: 100 g



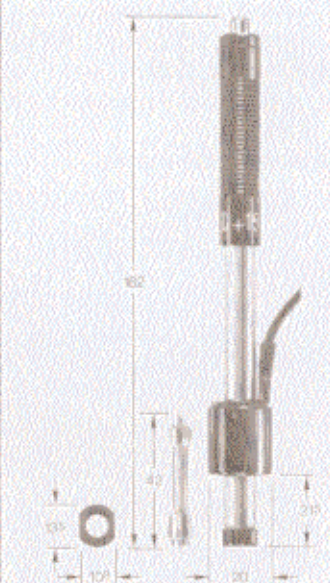
Impact Device DC

Special feature: Extremely short impact device. Spring loaded with a special loading stick. Otherwise as for type D.
Application: Use in very confined spaces, e.g. in holes, cylinders or for internal measurements on assembled machines.
Weight: 90 g



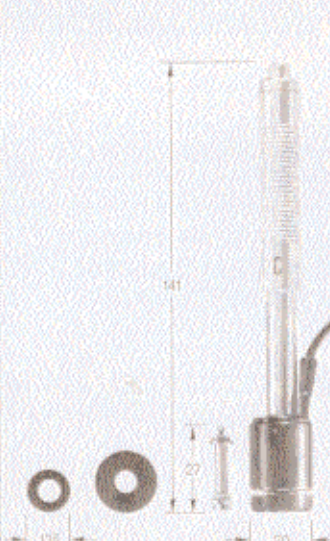
Impact Device D+15

Special feature: Particularly slim front section and with measuring coil moved back. Application: Hardness measurements in grooves and on recessed surfaces.
Weight: 100 g



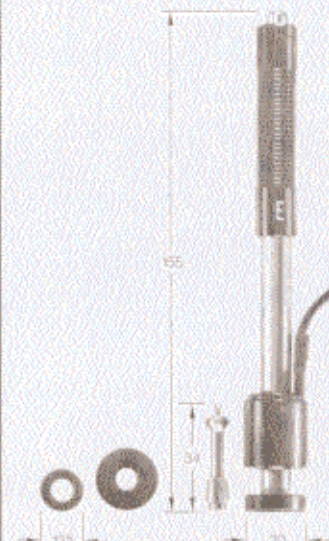
Impact Device C

Special feature: Reduced impact energy (approx. 1/4 of that for type D).
Application: Surface hardened components, coatings, thin walled or impact sensitive components (small measuring indentation).
Weight: 95 g



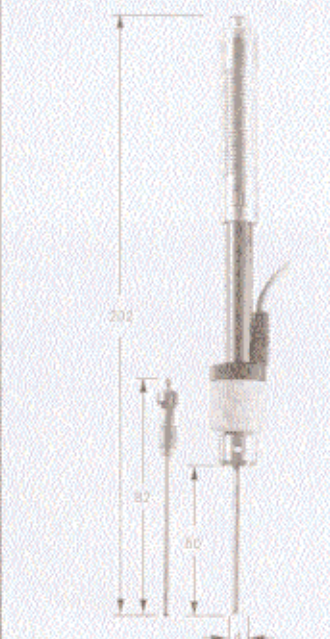
Impact Device E

Special feature: Synthetic diamond test tip (approx. 5000 HV).
Application: For measurements in the extremely high hardness range (always in excess of 50 HRC/650 HV). Tool steels with high carbide content inclusions. For measurements up to 1200 HV.
Weight: 100 g



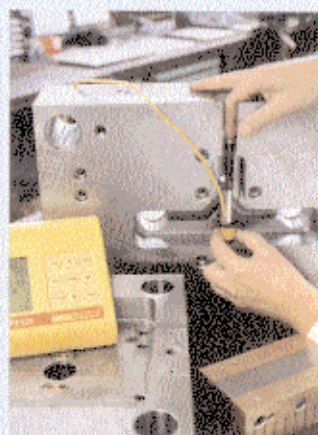
Impact Device DL

Special feature: Extremely slim and long front section.
Application: For measurements in extremely confined spaces or at the base of grooves.
Weight: 100 g



The most typical applications are rapid and informative hardness measurements:

- in stores for material identification
- in locations difficult of access and in confined spaces
- for testing hardness variations over larger testpieces areas
- in situ on heavy and large workpieces or on permanently installed system parts
- during manufacture, especially on series production parts
- on installed machines



Extremely operator-friendly

- ☐ Data Output
- ☐ Impact Direction
- ☒ Mean Value
- ☐ Measure Series No.
- ☐ Conversion
- ☐ Display range
- ☐ Limit Values
- ☐ Language
- ☐ Date/Time
- Select by ↑
- Start by START
- End by END



The user can set up the EQUOTIP device to his specific requirements with a few keys.

At a glance the large LCD monitor provides information on:

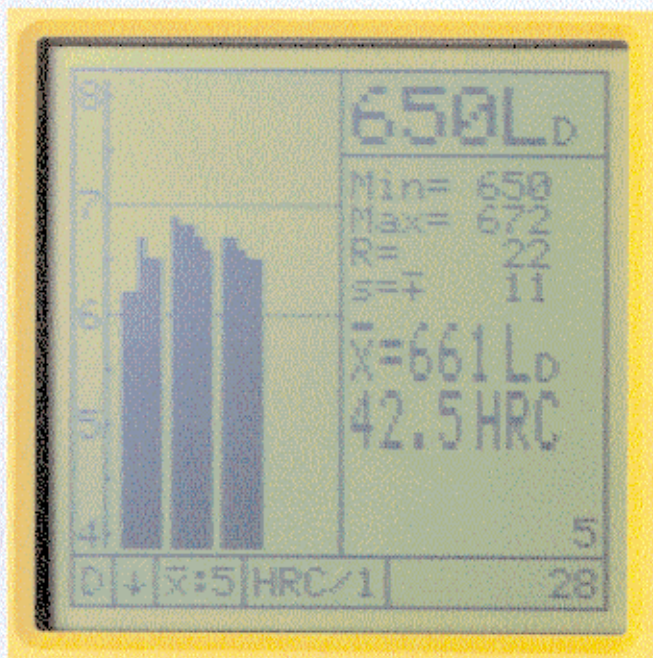
- hardness value L (measured value)
- lowest value (min.)
- highest value (max.)
- range (R)
- standard deviation (s)
- mean value (\bar{x})
- converted mean value
- Impact No.

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 setpoint limits.



EQUOTIP indicating device



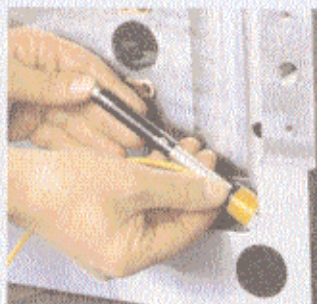
- Supplied by 6 Nos. 1.5 V Mignon cells, operating life with one set of batteries approximately 60 hours at 20° C
- Connection for standard mains supply 9 V DC, 0.2 A
- Permissible temperature range 0° C to + 50° C
- RS 232 C interface
- Dimensions: 180 x 175 x 80 mm / 800 g

Communications

The measured data can be transmitted via interface RS 232 C 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 232 C to a computer.

Support rings



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

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 testpiece 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 be determined for the individual readings. A surface of 10x10 mm is sufficient for measurement purposes. The

device can also be used without special measures on curved surfaces (radius of curvature in excess of 30 mm).

Workpieces of compact form and a weight of more than 5 kg can be tested 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 a rigid base. "Coupling" is effected by lightly coating the workpiece with coupling paste and "sticking" it firmly to a baseplate of adequate weight.

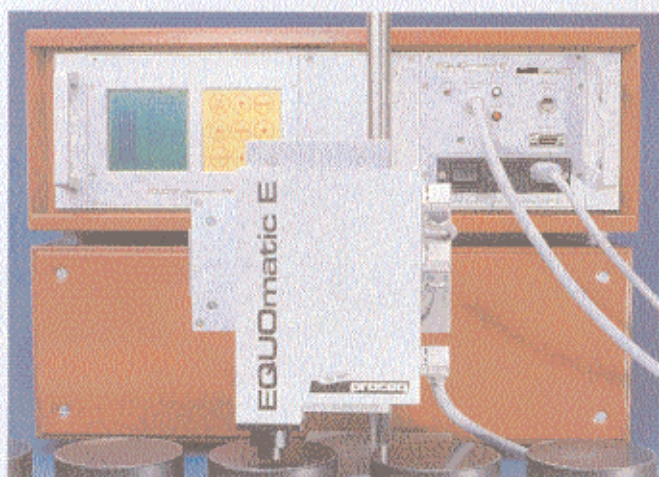
EQUOTIP

– reliable and operationally dependable

– no maintenance problems

Great care is taken to ensure faultless quality standards for the electronics and mechanical components. Demanding tolerances ensure that individual components (impact body, impact device and standard test blocks) are mutually interchangeable without loss of accuracy.

Automatic Hardness Tester EQUOmatic E



The automatic measuring head is a compact design intended for integration into the user's own test station. EQUOmatic E comprises one or more measuring heads which are automatically loaded, positioned, triggered and moved away.

Hardness readings are displayed on a central cubicle. The measurements are further processed, e.g. printed or stored, via serial interfaces RS 232 C. Let us know your particular measuring problems – we'll be glad to work out an individual suggestion.

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