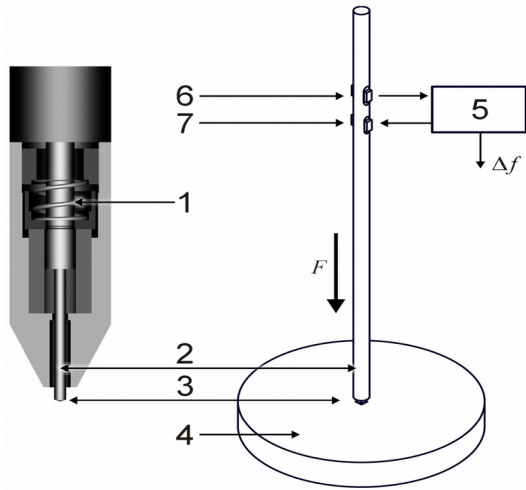


General Information about the UCI-Procedure



Key

- 1 Metalspring for generating the test load
- 2 Vibrating rod
- 3 Indenter
- 4 Test piece
- 5 Resonance amplifier
- 6 Receiving piezo element
- 7 Sending piezo element

Test load	Typical Applications
98 N	Small forgings, weldseam testing, testing of the heat affected zone (HAZ)
50 N	Induction- or case-hardened machine parts, e.g. Camshafts, turbines, weldseams, testing of the heat affected zone
10 N	Ionnitrided Embossing tools and matrices, forges, press
3 N	Layers, e.g. Copper and Chrome layers on steel cylinders ($t \geq 0,040$ mm), Copper gravure cylinders, coatings, hardened layers ($t \geq 0,020$ mm)

Sample and Mass

Natural vibrations of the sample can affect the UCI hardness testing, which means that without any further actions like coupling of the probe, a minimum wall thickness and mass according to the manufacturer specifications are necessary. Typical values are a minimum wall thickness of **5 mm** and the minimum dimension of **300 gr**.

Samples with a mass lower as the mentioned minimum or samples with sufficient mass, but with areas thinner than the needed minimum thickness, requires a coupling to a massive body according to the manufacturer specifications.

REMARK 1 An inappropriate coupling affects incorrect test results.

Special geometrical samples, e.g. Pipes, requires an additional support of the measuring point, so that the needed minimum thickness and minimum dimension can be smaller than the above mentioned values. The minimal testable radius of curvature is 3 mm.

REMARK 2 Small samples under the mention minimum dimensions can be tested aswell, if they are embedded or decoupled from free vibrations in another way.

Test load	Maximum middle roughness depth	
	Ra in μm	
	DIN 50159	ASTM A1038
98 N	1	15
50 N	0,8	10
10 N	0,5	5
3 N		2,5

Grain size according to FEPA-Standard (Federation of the European Producers of Abrasives)	120	180	240
Ra	app. 1,2 μm	app. 1,0 μm	app. 0,6 μm

[Source]: DIN 50159-1:01-2015 Metallische Werkstoffe – Härteprüfung nach UCI-Verfahren – Teil 1 & DIN 50159-2:01-2015 Metallische Werkstoffe – Härteprüfung nach UCI-Verfahren – Teil 2

General Information about the UCI-Procedure

Measurement

The measurement has to be done in a room temperature between 10 °C and 35 °C. If the temperature is out of these scale, it has to be noted in the test protocol. The sample temperature can affect the UCI testing.

It is important, that the sample doesn't move during the testing procedure. Maybe a mounting fixture is needed. Die The contact areas has to be clean and free of foreign bodies (Tinder, lubricants, dirt, etc.)

The test load has to be applicated growing steadily, shock-free and along the vibration rod. The vibrations of the sample or the probe during the UCI testing can affect the results and should be avoided.

The test is done vertical to the test surface. Differences > 5° from the perpendicular affects significant errors.

Before the start of a measuring series it is necessary to validate the shown hardness value with the test of a hardness test block.

After the manual or automated application of the test load, the measurement is initiated. The frequency displacement is recorded by the measuring unit and determined automatically.

For the determination of the UCI-Hardness, the average of at least three measuring values has to be determined

The distance between the intendation and the edge of the sample has to be **at least 5 mm**. For embedded or encoupled samples, the distance can be significant smaller.

Between two intendations there has to be a **minimum of 1mm** for materials like steel, copper or copper alloys and **minimum of 3 mm** for soft materials like light metal, lead, tin and their alloys.

You have to ensure that the place, where the testing is done, is free of vibrations and strong magnetic fields like in the near of incution ovens and electrical welding machines.

Requirements on hardness test blocks

To prevent spurious oscillations by the UCI-Sensor, the hardness test block needs a sufficient size. Normally a diameter or edge length of **50mm** and a thickness of **15mm** is enough.

[Quelle]: DIN 50159-1:01-2015 Metallische Werkstoffe – Härteprüfung nach UCI-Verfahren – Teil 1 & DIN 50159-2:01-2015 Metallische Werkstoffe – Härteprüfung nach UCI-Verfahren – Teil 2