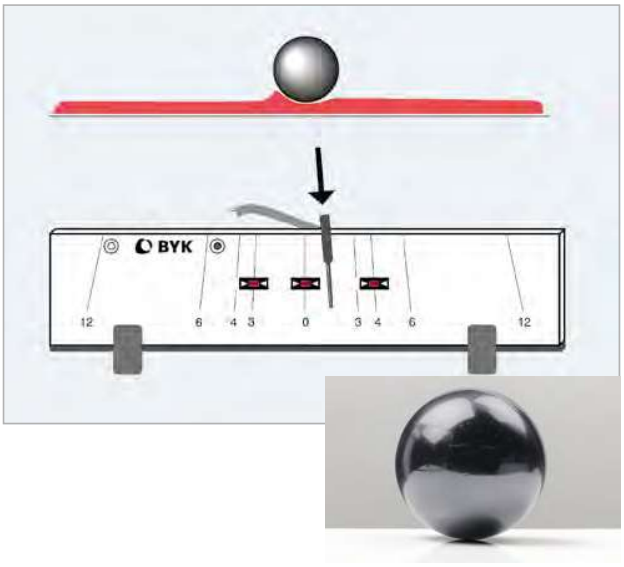
Pendulum Hardness

This method evaluates hardness by measuring the damping time of an oscillating pendulum. The pendulum rests with 2 stainless steel balls on the coating surface. A physical relationship exists between oscillation time, amplitude and the geometric dimensions of the pendulum. The viscoelastic behavior of the coating determines its hardness.

When the pendulum is set into motion, the balls roll on the surface and put pressure on the coating. Depending on the elasticity, the damping will be stronger or weaker. If there are no elastic forces, the pendulum will damp stronger. High elasticity will cause weak damping.

Two types of pendulums were standardized for this test method:

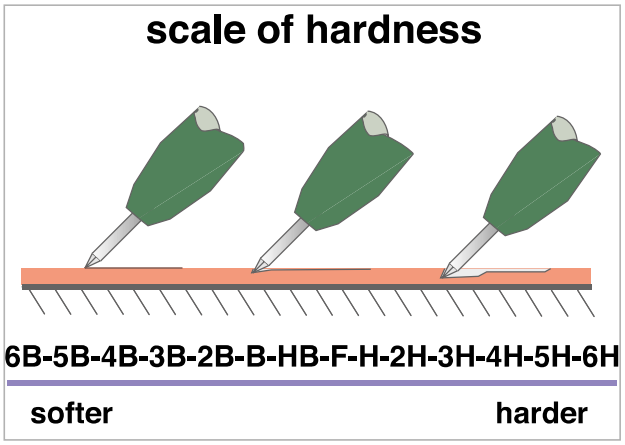
	König	Persoz
Weight	200 g ± 0.2	500 g ± 0.1
Diameter	0.2 in (5 mm)	0.3 in (8 mm)
Deflection Start	6°	12°
Deflection End	3°	4°
Period of Oscillation	1.4 s	1 s
Damping Time on Glass	250 ± 10 s	430 ± 10 s



Scratch Hardness

An ideal test for the quick evaluation of finished products. The results do not correlate with any of the other methods of hardness measurement.

The scratch can be performed with either a metal pin (Dur-O-Test) or pencils. Pencils of various degrees of hardness are drawn over the coating surface to determine which pencil causes indentation. This method is only applicable for smooth surfaces.



"Buchholz" Indentation Hardness

This test method is suitable for coatings with plastic deformation behavior. Coatings with elastic deformation behavior should not be evaluated with this test method, because after removal of the instrument an elastic coating will show no or very little indentation.

The instrument consists of a double cone block, which is placed on the coating for 30 seconds. Indentation is measured with the help of a precision microscope and is then calculated according to the following equation:

$$\text{Indentation Resistance (Buchholz)} = \frac{100\ \text{mm}}{\text{Indentation Length}}$$