1. Introducing the Elcometer 3045 Persoz and König Pendulum Hardness Tester

There are a number of ways to test the hardness of a coating or substrate. These include:

- The Scratch method; such as the Elcometer 3092 Sclerometer, where a hardened tip is drawn across a coating with varying degrees of force, and the coating is visually examined for damage – the harder the coating, the greater the force required to scratch it;
- The pencil hardness test – also known as the Wolff Wilborn test, where a pencil under a predefined force is pushed across the coating. The pencil hardness is increased from B, though HB to H, until the coating is scratched.
- and various Indentation methods; from the Buchholz Hardness Test, where a known downward force is applied to a formed shape for a predefined timeframe and the amount of indentation is measured; to the Barcol Tester and Shore Durometer, where the force required penetrate into a coating or material is measured by manually pressing a hardened tool onto the surface – the harder the coating, the greater the force required.

Another way to determine a coating or substrate’s hardness is to use the pendulum method. The pendulum method uses the concept of friction. Essentially, a pendulum of a fixed weight rests on the coated surface via two ball bearings. The softer the material, the more the bearings will sink into the surface or coating. Similarly, the harder the material, the less they will sink. As the pendulum swings, the softer the material, the faster swinging stops – as the material dampens the swing through friction.

The Elcometer 3045 Pendulum Hardness Tester not only measures the time taken, but also the number of swings it takes for the pendulum to slow down between defined angles of swing. The longer time and the more oscillations it takes to reduce the swing angle, the harder the material. The Pendulum Hardness Tester is therefore a comparative test. Whilst glass, for example, typically takes 430 swings (just over seven minutes), rubberised foam only takes 140 swings and a third of the time for the same reduction in swing angle.

There are two types of pendulum which can be used with the Elcometer 3045 Pendulum Hardness Tester – Persoz and König.

As the design of each pendulum is different, the way the test result is determined for each pendulum also differs. The Persoz requires the gauge to count the number of swings (oscillations) and the time it takes for the pendulum to reduce the angle of swing from 12° to 4°; whilst the König requires the reduction from 6° to 3°.

From its adjustable feet and dual axis bubble-level indicator to ensure an accurate test, to its automated calibration procedure ensuring the pendulum operates precisely within specified limits; the Elcometer 3045 is designed to provide accurate, repeatable and reproducible coating hardness measurements.

That’s why, from start to finish, the Elcometer 3054 is a fully automated test. So, once the sample and pendulum of choice are in place, and the door has been closed to protect the test from any draughts – the test begins at the push of a button.

Using infrared sensors the Elcometer 3045 accurately measures the time and number of oscillations, leaving no room for human error. If the rigid Perspex door is opened during a test, a warning signal
will alert you and the test will stop and not begin again until the instrument is reset, ensuring accurate, reliable results.

Once testing is complete, you can store your pendulum, along with the glass calibration tile, safely inside the unit, ready to use next time.

While you can record all of your results manually, the Elcometer 3045’s batch memory stores all of the test data - including the test type, the duration and number of oscillations of each test, along with the averages for the entire batch - for output to PC through Elcometer’s free reporting software, ElcoMaster - allowing you to go from raw data to professional reports in seconds.

This video is part of a series on the pendulum hardness test method. Click on any one of the titles on-screen to watch another video in the series.

For more information on the Elcometer 3045 Pendulum Hardness Tester, or any other Elcometer products, visit our website.