Measuring Surface Profile using the Elcometer 122 Replica Tape & Elcometer 124 Thickness Gauge

In the coatings industry, and particularly in the protective coatings industry, in order to maximise a coating's overall performance, it is essential to measure the surface profile of the blast cleaned substrate.

If the profile is too high then there is a danger that the profile peaks will be insufficiently coated - leading to premature corrosion or rust spots. If the profile is too small, then there may be an insufficient key for the coating - leading to poor adhesion and premature coating failures.

In addition to comparators and digital surface profile gauges - one of the most recognised methods used to measure the surface profile of a blast cleaned metal substrate, is the Elcometer 122 Testex® Replica Tape, together with a spring micrometer such as the Elcometer 124.

The Elcometer 122 Testex® Tape consists of a compressible foam pad attached to a 50um (2 mils) thick mylar backing strip.

Once the protective paper is removed, the Elcometer 122 tape is applied to the surface and the mylar backing is rubbed with a burnishing tool, until the circular mylar window turns a uniform light grey.

By rubbing the tape into the surface, the foam is pushed down and creates an inverse or mirror image of the profile. In other words, the peaks of the foam represent the valleys of the substrate, and vice-versa.

The tape is then removed from the substrate - you may want to fold a corner of the tape over on itself to make this easier - and measured using an Elcometer 124 gauge, which has been correctly 'zeroed'.

To zero the Elcometer 124 before measurement, simply release the lever to allow the anvils to come together. Unlock the knurled screw, and rotate the outer wheel of the dial so that the needle points to zero. Then re-tighten the screw.

Place the tape between the two measurement anvils and release the lever. Measure the thickness and then subtract 50um (2 mils) from the value to remove the thickness of the mylar backing from your reading.

Alternatively, you can set the Elcometer 124 to automatically subtract the thickness of the backing. Simply release the lever, unlock the knurled screw, and rotate the outer wheel of the dial clockwise until the needle points at 150 microns or 8 mils, then retighten the screw. The surface profile measurement is now shown instantly.

When the Elcometer 124 measures the tape, the anvils rest on the peaks of the foam, thereby measuring the peak to valley height – along with the mylar backing, which you subtract for your reading.

For this reason, if the profile is greater than the foam range of the tape, then the tape "maxes out" without measuring the true profile thickness – giving you a lower, incorrect profile measurement.

That's why it's critical to choose the correct tape range for your profile. There are four measurement ranges, or "grades" of the Elcometer 122 Testex® Replica Tape available – Coarse Minus, Coarse, Extra-Coarse, and Extra-Coarse Plus.

If you obtain a measurement which is at the maximum value of the tape - its range is written on each test piece for ease - select the next tape grade up and test again. Similarly if the reading is at the bottom of the tape grade, choose the next grade down and retest.

Looking closely at the Coarse and the Extra-Coarse tape, you will see there is an overlap between 38-64 microns or 1.5 to 2.5 mils.

If you measure a profile reading that's between 38 and 64µm (1.5 and 2.5mils), a second measurement should be taken at the same spot, with the other grade of tape. If both values are within this range, then the peak-to-valley height is the average of the two values. However, if the second value is outside this range, this should be used and the initial value discarded. This is displayed on the tape for clarity.

It is important to note that if the compressive force of the spring micrometer is too great then the anvils will crush the foam – providing a much lower profile measurement than is actually there.

The Elcometer 124 is carefully designed to minimise this compressive force, ensuring that the pressure of the anvils do not compress the foam, thereby ensuring the greatest measurement accuracy.

For more information and training on the Elcometer 124 Thickness Gauge, Elcometer 122 Testex® Tape, or other Elcometer products, visit Elcometer.com.