

Testex Press-O-Film Instructions

Testex Press-O-Film replica tape offers a simple way of obtaining an impression of a surface. The impression can then be measured in one of two ways. Either

- 1) an optical or other electronic profiling device can be used to produce maps of the replica's surface topography, or
- 2) a simple micrometric digital or dial thickness gage can be used to determine the average maximum peak-to-valley roughness, or "profile," of the replicated surface.

This second method is discussed in what follows.

What replica tape is:

Testex replica film consists of a layer of crushable plastic micro-foam coated onto an incompressible polyester substrate of highly uniform thickness. This film is mounted on a piece of adhesive-backed paper tape and is sold, as Press-O-Film replica tape, in a number of grades to accommodate measurements in different "profile" (peak-to-valley roughness) ranges.

The primary measurement range is 0.8 to 4.5 mils or 20 to 115 μm .

1 mil = 0.001 inch = 25 micrometers (μm)

How it works:

When compressed against a surface, the foam collapses to about 25% of its pre-collapse thickness. During compression, the foam acquires an impression of the surface against which it is bur-nished. The highest peaks on the original surface displace the fully compressed foam and come to rest against the polyester substrate. The deepest valleys on the original create the highest peaks on the replica. Consequently, the thickness of the compressed foam equals the average maximum peak-to-valley profile. The overall thickness of the compressed film is this profile plus the thickness of the incompressible polyester.

A spring-loaded micrometer gage is used to measure the thick-ness of the replica. Subtracting the substrate thickness from this gives the average maximum peak-to-valley roughness or "profile".

Characteristics of the spring micrometer gage:

All characterization of replica tape profile measurement has been performed with a gage having a measurement accuracy of 0.2 mil (5 μm), closing force of 4 ounces (1.5 N) and at least one anvil having a circular diameter of 0.25 inch (6.3 mm).

Suitable *inch and metric unit* gages are available from Testex and other companies but great care should be taken to assure that the gage is specifically designed to be used with replica tape.

Using the proper gage is essential to obtaining correct profiles.

(2010 "HT Averaging") Instructions for Using Press-O-Film With a Micrometric Thickness Gage:

Step 1: Locate a representative site for measurement.

Step 2: Select the appropriate grade of Press-O-Film replica tape based on your target profile:

For 0.8 to 2.5 mils (20 to 64 μm) => **Coarse** grade

For 1.5 to 4.5 mils (38 to 115 μm) => **X-Coarse** grade

Step 3: Prepare thickness gage: clean anvils and adjust zero point to read minus 2.0 mils (minus 50 μm). On a conventional Testex gage **this is equivalent to pre-setting to plus 8.0 mils (or, on a metric gage, plus 150 μm).**

Pre-setting the gage in this way automatically subtracts the thick-ness of the incompressible substrate from all further readings.

Step 4: Pull a single piece of adhesive-backed printed paper free of the release paper. The Press-O-Film is the 0.4 inch (1 cm) square white plastic film at the center of the adhesive-backed paper. A paper "bulls-eye" circle should remain behind on the release paper.

Step 5: Check the uncompressed film's thickness with gage. **X-Coarse** grade tape should have a (substrate corrected) thick-ness between about 5.0 and 6.0 mils (125 and 150 μm).

Step 6: Apply film to surface to be measured. Press the adhesive -backed paper to hold the film firmly in place.

Step 7: Firmly compress replica film with the smoothest surface on the round-end rubbing tool provided. (In a pinch, the rounded edge of the tape dispenser is also an acceptable tool.) Fully com-press all parts of the film to produce a uniform pebblegrain ap-pearance. Burnishing normally takes about 40 seconds.

Step 8: Remove the replica and place it between anvils of mi-crometer gage, making sure replica is centered between anvils.

Step 9 (Averaging):

A) If a measurement with either **Coarse** or **X-Coarse** grade is in the 1.5 to 2.5 mil (38 to 64 μm) **overlap window** (inclusive), take a 2nd reading with the OTHER grade.

If **both** readings are in the 1.5 to 2.5 mil (38 to 64 μm) window, record the **average** as the observed profile.

B) If the reading obtained with either grade is **outside this overlap window**, i.e., is between 0.8 and 1.4 mils (20 to 37 μm) or between 2.6 and 4.5 mils (65 and 115 μm) - it **should be used as is**, i.e., without averaging, as the profile.

A video describing this procedure can be found at:

www.testextape.com

Averaging:

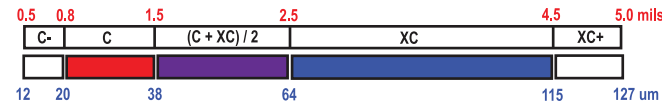
"Averaging", as described in Step 9A of the preceding instruc-tions, means:

adding the profile obtained for a given surface using **Coarse** tape to the profile obtained for the same surface using **X-Coarse** tape and **dividing their sum by 2**.

This result, is—in the "overlap window"—the profile.

Tape Range Illustration:

A graphic illustrating the ranges over which averaging should and should not be applied appears on each piece of tape and is re-produced below.



Accuracy and Reproducibility of Measurement:

Different techniques for measuring surface roughness generally yield different numerical values because they implicitly or explic-itly assume differing definitions of profile. Profiles obtained in different ways may not even be simply related. Different tech-niques may, for instance, be affected in divergent ways by choice of blast medium or by the presence or absence of waviness.

Replica tape measurements of profile are roughly similar in mag-nitude to the ISO-defined roughness parameter, R_t , "Total Height of the Profile", commonly called "peak-to-valley roughness".

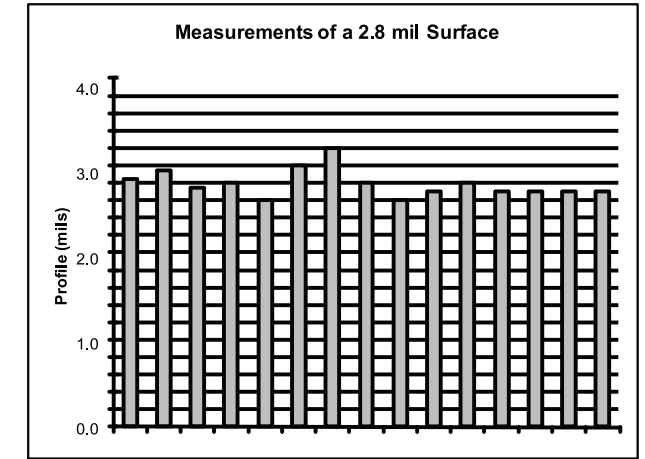
Over most of Press-O-Film's 0.8 to 4.5 mil (20 to 115 μm) primary range, measurements depart from linearity by less than about 0.3 mils (8 μm) and display a one-standard-deviation statistical error of under ± 0.2 mils (± 5 μm). Here, a profile "measurement" is defined to be the average of 2 replicas.

Above the high end of its range, replica tape tends to underestimate the profile height.

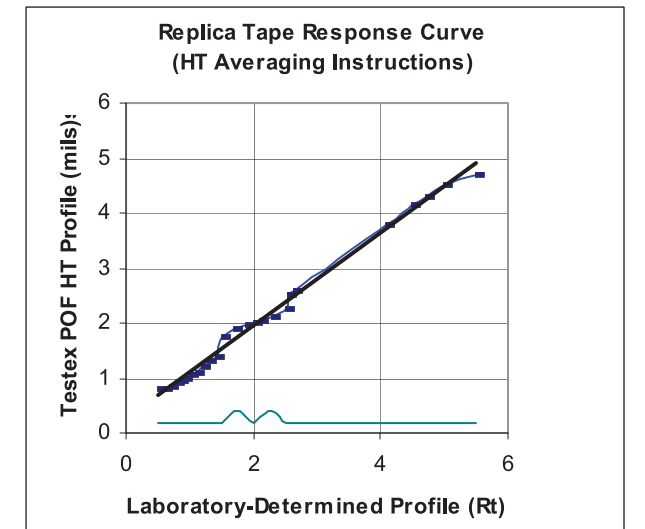
Below the low end of its range, replica tape tends to overestimate the profile height.

Upper end (**X-Coarse Plus**) and lower end (**Coarse Minus**) check grades of tape should be used to confirm that measurements are within the tape's primary range.

Graphical data in the adjacent panel is explained on the overleaf.



Typical Measurement Dispersion (Representative Surface)
Average profile = 2.8 mils (71 μm)
Standard deviation = 0.18 mil (5 μm)



Blue Curve = Replica Tape Profile
Black Line = Straight Line Fit
Green Curve (at bottom)
= Measurement Uncertainty = Standard Deviation