



# COATING THICKNESS TESTERS

## MODELS E10 & E10M (Metric)

Version 3.5

### IMPORTANT

The **SERFILCO E10** uses the electronic properties of the base material as the basis for measurement. Large masses of ferrous materials and strong electromagnetic fields adversely affect these measurements. Therefore, do not attempt measurements on steel benchtops or near electric motors, transformers or high current conductors. If it is necessary to make measurements on a steel benchtop, install a one-half inch thick insulator (wood, plastic, etc.) between the benchtop and the materials under test.

It is imperative that the unit be used in an environment that is thermally stable. Any sudden changes in ambient temperature will adversely affect the accuracy of the calibration. That is, an ambient temperature change of more than  $\pm 5$  will result in a considerable deviation of any measurement data. For example, if the unit is transported from a cold automobile trunk into a laboratory at room temperature, the unit should be allowed to equilibrate to room temperature.

It is recommended that after power-up, wait at least fifteen seconds for the electronics to stabilize before measuring and/or calibrating. Also, periodic checks throughout the work day should be made to ascertain the validity of the calibration. This may be accomplished by measuring the values of the base and calibration foils.

### NOTE:

**Unit automatically powers down after 10 minutes of inactivity.**

The upper and lower limit calibration standards must be treated with care. The accuracy of the E10 depends upon this thickness, and improper treatment or misuse will result in erroneous measurement readings. It is strongly recommended that the standard be kept in the provided "Ziploc" bag at all times except when used for the calibration procedure. Oil films or oxidation on the standards or materials to be tested adversely affect the accuracy of the measurements.

### APPLICATION

The **SERFILCO E10** is a non-destructive coating thickness measuring instrument based upon the eddy current principle. It is capable of measuring:

1. Non-conductive coatings on conductive substrates.

The **SERFILCO E10** meets ISO2360, ASTM B244, BS5411 (3), and DIN50984 requirements.

### EQUIPMENT SUPPLIED

1. **SERFILCO E10** with probe
2. Two 9 volt battery
3. Vinyl case
4. Operating instructions
5. 25 Mil Cal. foil
6. Non-Ferrous substrate

### FUNCTIONS FOR KEYPAD

**DISP** (Display) During the test process, the user may desire to take account of all the statistical information. By pressing DISP, the Liquid crystal display (LCD) shows the statistical values presently stored in memory.

The LCD will show maximum, minimum, standard deviation, and the total number of samples taken. DISP may be entered at any time to display updated statistics. The treatment and analysis of data plays an important role in thickness, and other types of reliability testing.

The definition of E10 statistical components are:

**SAMPLE SIZE** - This is the total number of data points. The sample size is referred to as "no". The **SERFILCO E10** accommodates sample sizes of less than or equal to 255.

**MEAN VALUE** - The mean value is the average of the measurements taken ( $\bar{x}$ , "x-bar").

**STANDARD DEVIATION** - This is the variation in a group of measurements. Standard deviation is also known as "sigma" ( $\sigma$ ). Sigma is the measure of certainty in which 68.66% of all data points are from the mean value or average value.

**RANGE** - These are the minimum and maximum values of the measurements.

In addition to displaying data and results, the LCD also prompts the user as to which possible steps are available.

**CAL** (Calibrate) Calibration is required for each type of substrate being tested. This encompasses variations in the electronic properties of the substrate. The calibration data is retained in non-volatile memory and therefore recalled upon power-up, but will be modified during subsequent calibrations.

**REV** (Review) During the test process the user may review the data collected. When pressing REV, each data point will be displayed, starting from 1 to the number of data points taken.

**DEL** (Delete) This key allows deletion of data by two possible methods. While in the test mode, the present and prior data points may be deleted in reverse order by pressing DEL. While in review mode, any number of data points may be deleted also by pressing DEL.

**RESET** After enough data points have been collected and the statistical results displayed, pressing reset clears the memory and allows the user to take more data points. Reset may be used at any time regardless of the number of data points in memory.

**ON** (Power UP/Power DOWN) Power up by pressing once.

Power down by pressing again. When powering down, all data is lost, but the calibration is retained in memory.

**F1, GO key    F2, NOGO key**

**PREPARATION FOR MEASUREMENT**

The **SERFILCO E10** is supplied with a spring loaded probe which enables the user to apply a constant pressure and stable positioning.

Before making measurements, always make sure the surface being measured is dry, clean, and free from grease and dust.

When measurements are made, the probe should be held perpendicular and firmly to the surface being measured. Several measurements should be taken in a test area because coatings, by nature, are rarely uniform. To establish the test area for quality control, measure several objects before evaluating.

The **SERFILCO E10** operates on the eddy current principle, and under certain circumstances can be affected by external factors. These external factors lead to a deviation from the true thickness of the coating. When making measurements, do not measure the edges, shoulders, or any other material discontinuities.

The **MINIMUM COATINGS/SUBSTRATE** dimensions are:  
 AREA: 1.2" X 1.2" (30 X 30 mm)  
 THICKNESS: 32 mil (0.8 mm)  
 CURVATURE: 0.6" radius (15 mm)

**MEASUREMENT**

This section describes the step by step test procedure. It is recommended that the user understand this procedure as well as the purpose of each key completely before proceeding. Briefly, the instrument must be powered-up, calibrated to a standard specific to the range of the instrument and a bare base material of identical geometry and composition as the part to be tested.

STEP	KEY TO BE PRESSED	DISPLAY
1. Power-Up X.XX	press ON	E10 Ver 00.00 - 25.00 MI Measure MI N= X=

The instrument is now in the measurement mode. Using the last retained calibration, measurements can now be made. If there is an application change, a new calibration should be entered.

2. Calibrate	press CAL	CALIBRATE
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	N= X=
	CALIBRATE Measure base?
press F1	BASE Measure base
take at least 3 measurements	BASE XXXX AD N=X X=XXXX
press F1	XXXX AD Measure STD 1
press F1	STD 1 AD Measure STD 1?
take at least three measurements using the 25 Mil (635um) foil. X=XXXXX	STD XXXXX AD N = X
press F1	Measure MI N= X=

The instrument is now back in the measurement mode, using the new calibration. It is recommended that the user now take a specific standard and take measurements. The measurements should be ± 5% of the standard value to verify the accuracy of the calibration procedure. If the readings are not within the range, repeat the calibration portion of this procedure as necessary. With eddy current based instrument, periodic base corrections are necessary.

3. Test	take at least 3 measurements	Measure XX.XX MI N=X X=XX.XX
4. Review MI	press REV	Review XX.XX N=X X=XX.XX
	press F2	each reading will appear on LCD as F2 is pushed

To review in descending order, press X.

5. Delete measure-	When reviewing the measurements, any measurement may be deleted by pressing the DEL key.
To	get back into MEASURE, press F1.

6. Results MI X=XX.XX	press DISP for number of readings & measurements	Results N = X
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MI	press DISP for standard deviation	Results s =.XX 6s=.XX
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MI	press DISP for high and low readings	Results H=XX.XXL=XX.XX
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7. Clear XX.XX MI	press F1 or F2	Measure N=X X=XX.XX
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press RESET

Clearing

Measure MI  
N= X=

8. Power-down off press ON

Turning

## BATTERY AND AC ADAPTOR

The **SERFILCO E10** requires one 9 volt battery, type NEDA 1604D. The battery compartment is on the underside of the instrument and can be opened by sliding the cover upward.

If the message "BT" appears in the display, the battery must be changed. Although the **SERFILCO E10** will continue to measure for approximately 6 hours after the message appears, it is recommended the battery be changed immediately. When the instrument is stored for long periods, remove the battery.

The **SERFILCO E10** can also be supplied with an optional AC adaptor. The AC adaptor plugs into the top of the instrument.

## TECHNICAL DATA

- RANGE: 0-25 mils (0-635um)
- ACCURACY:  $\pm 5\%$
- DISPLAY: 16 col. x 2 row dot matrix LCD, 0.22"h x 0.12"w (.56mm x .29mm)
- DISPLAY RESOLUTION:  $\pm 80^\circ$  viewing angle
- DISPLAY HOLD TIME: 10 minutes
- BATTERY LIFE: 16 hours continuous duty
- AC ADAPTOR: Input AC 120V 60 Hz 8W or Input AC 220V 50 Hz 8W
- DIMENSIONS: 7.08"L x 3.93"W x 1.73"H (180mm x 100mm x 44mm)
- WEIGHT: 1.02 lbs. (0.46kg)
- PROBE: Single pole with 36" cable