



® Management Procedure 2550
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Calibration Procedure

DeFelsko Corporation

PosiTector RTRH and RTRP

Replica Tape Reader Probes

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1 Introduction and UUC Performance Requirements

1.1 This procedure describes the calibration of the profile height of the DeFelsko Corporation PosiTector RTRH and RTRP replica tape reader probes with the following specification:

Table 1-1 Measurement Ranges

Unit	Measurement Range*
PosiTector RTRH & RTRP	20 - 115 microns (0.8 – 4.5 mils)

* Note the PosiTector RTR measures the average maximum peak-to-valley profile height of Press-O-Film™ replica tape. Values are reported as either H or H_L. H readings represent the average maximum peak-to-valley profile height. H_L readings represent the linearized peak-to-valley profile height measurement that has been adjusted for the non-linearity of replica tape.

1.2 Peak density and H_L of the PosiTector RTRP replica tape reader are not calibrated.

1.3 The unit being calibrated will be referred to as the UUC (Unit-Under-Calibration).

2 Measurement Standards and Support Equipment Performance Requirements

2.1 The UUC accuracy requirements are based upon the published UUC performance specifications.

2.2 The test uncertainty ratio applied in this Calibration Procedure is 4:1 unless otherwise stated.

2.3 The Minimum-Use-Specifications are the minimum test equipment specifications required to meet all the UUC accuracy requirements and the test uncertainty ratio applied.

Table 2-1 UUC Accuracy Requirements and Description

UUC	Parameter	Performance Specifications		Test Method
RTRH & RTRP	H	20 – 115 microns (0.8 – 4.5 mils)	± 5 microns (± 0.2 mils)	Certified Shim

Table 2-2 Minimum use specification

Parameter	Range	Accuracy
H	20 – 115 microns (0.8 – 4.5 mils)	± 1.25 microns (± 0.05 mils)

Table 2-3 Actual Equipment Specification

Parameter	Equipment Generic Name	Range	Accuracy	Manufacturer / Model #’s Applicable
H	Certified Shim	75 - 125 um (3 – 5 mils)	± 1.25 um (± 0.05 mils)	DeFelsko CSSRTR

Caution: The instructions in this Calibration Procedure relate specifically to the equipment and conditions listed in Section 2. If other equipment is substituted, the information and instructions must be interpreted accordingly.

Table 2-4 Calibration Environmental and Warm-Up Requirements

Measurement Standards & Support Equipment Environmental Requirements:	Temperature: 23 ± 5° C. Relative Humidity: Less than 95%
Measurement Standards & Support Equipment Warm-up and Stabilization Requirements:	Not Required

3 Preliminary Operations

Note: Review the entire document before starting the calibration process.

3.1 Visual Inspection

3.1.1 Visually inspect the UUC for:

- Contamination on the measuring surfaces
- Damage to the buttons or probe housing
- Misalignment of the measuring surfaces
- Proper identification
- For body/probe combinations review the body for damage

3.1.2 Damage or excess wear shall be repaired prior to beginning the calibration process.

3.2 Probe Cleaning

3.2.1 Ensure the UUC is powered off.

3.2.2 Place a card reader cleaning card between the measuring surfaces.

3.2.3 Squeeze both buttons of the probe simultaneously to close the measuring head.

3.2.4 While keeping the buttons depressed, move the cleaning card back and forth several times.

Note: The cleaning card can be used multiple times but it may need to be moistened with isopropyl alcohol after the package has been open for several minutes.

3.2.5 Inspect the measuring surfaces. If there is any contamination, repeat the cleaning process.

3.3 Gage Reset:

- 3.3.1 When the UUC is powered down, simultaneously hold the “+” and middle buttons until the reset symbol appears.
- 3.3.2 When the UUC prompts you, depress both probe buttons simultaneously to perform a probe zero. Make sure to hold the buttons until you hear the UUC beep.
- 3.3.3 Enter the “Cal Settings” menu and verify that “Linearize” is not selected.

4 Calibration Process

Note: Whenever the test requirement is not met, verify the results of each test and take corrective action before proceeding.

- 4.1 Review the Performance Requirements Table 5-1.
- 4.2 Depress both probe buttons simultaneously without a shim in the probe to zero the probe. This must be done before every measurement.
- 4.3 Insert the 75 micron (3 mil) shim between the measurement surfaces and depress both probe buttons simultaneously. Any movement of the shim during the measurement process will impact the measurement, so let go of the shim once the probe is holding it.
- 4.4 After the measurement is complete, hold the shim and release the probe buttons. Record the H measurement value.

Note: The PosiTector RTR measures the average maximum peak-to-valley profile height of Press-O-Film™ replica tape. The gage subtracts 50.8 microns (2 mils) from measurements to compensate for the thickness of the polyester film on the Press-O-Film™. When measuring shims all readings will be 50.8 microns (2 mils) lower than actual.

- 4.5 Repeat steps 4.2 – 4.4 with the 125 micron (5 mil) shim.

5 Performance Requirements

Table 5-1 Performance Requirements and Calibration Data for PosiTector RTRH & RTRP

Shim Value (microns)	Adjusted Shim Reading ^❶ (microns)	Min. Reading Allowed ^❷ (microns)	UUC Reading (microns)	Max. Reading Allowed ^❸ (microns)
A	B			
			H =	
			H =	

❶ Calculation: $A - 50.8$

❷ Calculation: $(B - 5)$. Round up to the nearest micron.

❸ Calculation $(B + 5)$. Round down to the nearest micron.

To convert from microns to mils divide by 25.4

Management Procedure Change Notice

Procedure Number: MP 2550

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Date of Change: April 5, 2023

Title: Calibration Procedure for PosiTector RTRH & RTRP

Reason for Change: <ul style="list-style-type: none">• Change to “Cal Settings” menu
Description of Change: <ul style="list-style-type: none">• In step 3.3.3 – changed “unselect “Linearize”” to “verify that “Linearize” is not selected”• Removed the Cal Setting step to select the proper tape grade (was step 4.2)

I confirm I have read and understand the procedure and the change described above.

Printed Name	Signature	Date

Management Form 0010.02-05/1998

Calibration Procedure

PosiTector SPG, SPG-S, SPG-OS, SPG-CS & SPG-TS Surface Profile Gage

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1 Introduction and UUC Performance Requirements

1.1 This procedure describes the calibration of DeFelsko Corporation PosiTector SPG, SPG-S, SPG-OS, SPG-CS & SPG-TS probe and gage.

Table 1-1

Models	Measurement Range
SPG, SPG-S & SPG-OS	0 - 500 microns (0 - 20 mils)
SPG-CS	0 - 1500 microns (0 - 60 mils)
SPG-TS	0 - 6 mm (0 - 250 mils)

1.2 The unit being calibrated will be referred to as the UUC (unit-under-calibration).

2 Measurement Standards and Support Equipment Performance Requirements

2.1 The UUC accuracy requirements are based upon the published UUC performance specifications.

2.2 The test uncertainty ratio applied in this Calibration Procedure is 4:1 unless otherwise stated.

2.3 The Minimum-Use-Specifications are the minimum test equipment specifications required to meet all the UUC accuracy requirements and the test uncertainty ratio applied.

Table 2-1 UUC Accuracy Requirements and Description

Model	Range	Performance Specifications	Test Method
SPG, SPG-S & SPG-OS	0 - 500 microns (0 - 20 mils)	$\pm (5 \text{ microns} + 5\% \text{ of reading})$ $\pm (0.2 \text{ mils} + 5\% \text{ of reading})$ $\pm (0.076 \text{ mm} + 1\% \text{ of reading})$ $\pm (3 \text{ mil} + 1\% \text{ of reading})$	Compared to Reference Standards
SPG-CS	0 - 1500 microns (0 - 60 mils)		
SPG-TS	0 - 6 mm (0 - 250 mils)		

Table 2-2 Minimum Use Specification

	Range	Accuracy
SPG, SPG-S & SPG-OS	0 - 500 microns (0 - 20 mils)	$\pm 1.25 \text{ microns}$ ($\pm 0.05 \text{ mils}$)
SPG-CS	0 - 1500 microns (0 - 60 mils)	$\pm 1.25 \text{ microns}$ ($\pm 0.05 \text{ mils}$)
SPG-TS	0 - 6 mm (0 - 250 mils)	$\pm 19.05 \text{ microns}$ ($\pm 0.75 \text{ mils}$)

Table 2-3 Actual Equipment Specification

Equipment Generic Name	Range	Accuracy	Manufacturer/Model #'s Applicable
Reference Standards	0 – 6 mm (0 – 250 mils)	± 1.25 microns (± 0.05 mils)	DeFelsko Corp.

Caution: The instructions in this Calibration Procedure relate specifically to the equipment and conditions listed in Section 2. If other equipment is substituted, the information and instructions must be interpreted accordingly.

Table 2-4 Calibration Environmental and Warm-up Requirements

Measurement Standards & Support Equipment Environmental Requirements:	Temperature: 23 ± 5° C. Relative Humidity: Less than 95%
Measurement Standards & Support Equipment Warm-up and Stabilization Requirements:	Not Required

3 Preliminary Operations

Note: Review the entire document before starting the calibration process.

3.1 Visual Inspection

3.1.1 Visually inspect the UUC for, but not limited to:

- Loose probe tip
- probe tip wear or damage
- Dirty or damage probe base plate

3.1.2 Damage or excess wear shall be repaired prior to beginning the calibration process.

3.2 Verify the Reference Standards and SPG base plate and tip are all clean.

3.3 Gage Reset

3.3.1 For bodies with serial numbers after 700000; when the unit is powered down, simultaneously hold the “+” and middle buttons until the reset symbol appears. All other bodies press and hold the “+” button.

Caution: Be sure to keep the probe off any surface during the RESET process.

3.4 Probe Zero

3.4.1 Select “ZERO” from the gage menu and measure the zero plate. One measurement is sufficient.

Note: Careful alignment is required when using the SPG-OS on the zero plate on the reference standards.

3.4.2 Perform a zero check by measuring the same plate. For SPG, SPG-S, SPG-OS and SPG-CS; If the gage does not read within ± 3 microns (± 0.1 mils), repeat the ZERO function. For SPG-TS; if the gage does not read within ± 0.07 mm (± 3 mils), repeat the ZERO function.

4 Calibration Process

Note: Whenever the test requirement is not met, verify the results of each test and take corrective action before proceeding.

4.1 Review the Performance Requirements Table 5-1.

4.2 Using the appropriate certificate template for the UUC, record the thickness of the Reference Standards from their calibration certificate. For the SPG, SPG-S and SPG-OS it is approximately 51, 178 & 508 microns. For the SPG-CS it is approximately 178, 508 and 1,524 microns. For the SPG-TS it is approximately 1.524, 2.540, 3.810 & 5.080 mm.

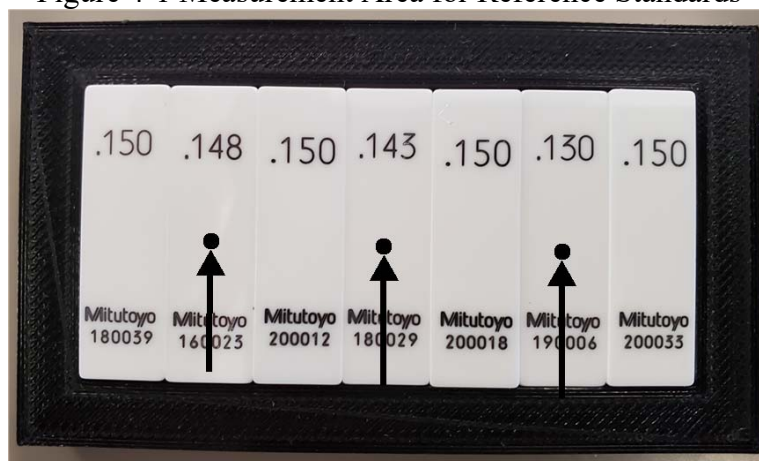
4.3 Determine the allowed range of readings for the UUC using the calculation methods shown in Table 5-1.

4.4 Use the UUC to take readings of all the reference standards. Verify that the readings are within the allowable limits determined in 4.3. Record the readings on the certificate.

Note: Record all digits displayed on the gage.

4.5 When taking readings the probe tip shall be located in the center of the Reference Standard as shown below.

Figure 4-1 Measurement Area for Reference Standards



4.6 Turn off the gage, perform a reset per section 3.3, then turn off the gage.

5 Performance Requirements

Note: The technician shall collect the data needed to complete columns A and B of the appropriate table below. Do not write in this procedure.

Table 5-1 Performance Requirements and Calibration Data for PosiTector SPG

Standard Thickness (microns)	Min. Reading Allowed ^① (microns)	Max. Reading Allowed ^② (microns)	Gage Measurement (microns)
A			B

SPG, SPG-S, SPG-OS and SPG-CS

① Calculation: $(A \times 0.95) - 5$. Round up to the nearest 1 micron.

② Calculation: $(A \times 1.05) + 5$. Round down to the nearest 1 micron.

* For imperial/metric readings convert using 1 mil = 25.4 microns

SPG-TS

① Calculation: $(A \times 0.99) - 0.025$. Round up to the nearest 0.02 mm.

② Calculation: $(A \times 1.01) + 0.025$. Round down to the nearest 0.02 mm.

Management Procedure Change Notice

Procedure Number: MP 2541

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Date of Change: July 21, 2023

Title: Calibration Procedure, PosiTector SPG, SPG-S, SPG-OS,
SPG-CS & SPG-TS Surface Profile Gage

Reason for Change: <ul style="list-style-type: none">• Clarify reference standard values
Description of Change: <ul style="list-style-type: none">• In Section 4.2 specified values are approximate and to use reference standard values from calibration certificate

I confirm I have read and understand the procedure and the change described above.

Printed Name	Signature	Date

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