DeFelsko®

Management Procedure 2571
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Calibration Procedure

DeFelsko Corporation

PosiTest AT Adhesion Tester Calibration

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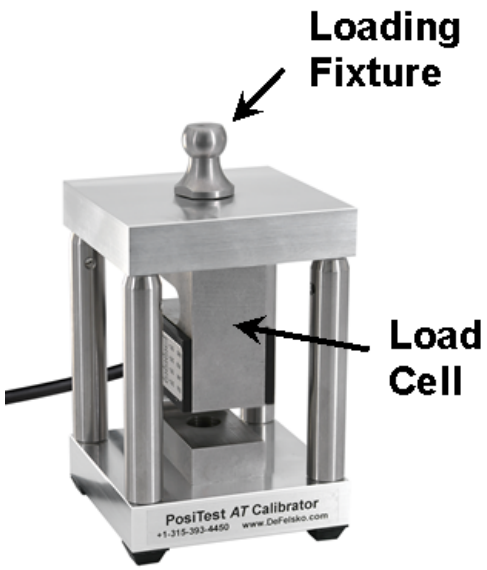
This procedure describes the calibration of DeFelsko Corporation PosiTest AT-M and AT-A Pull-Off Adhesion Testers using the PosiTest AT Calibrator (ATC).



1 Set-up

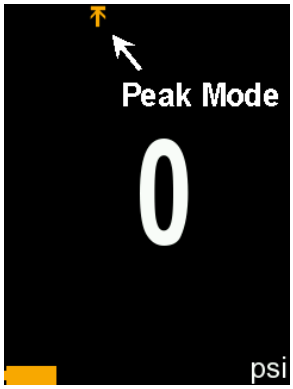
1.1 The environment that the calibration will be performed in must be controlled to at least 23 ± 5°C.

1.2 Visually inspect the adhesion tester for damage to the display, keypad, hose, enclosure, or quick disconnect coupling that may prevent it from working properly.

1.3 The PosiTest AT actuator must have a standoff for 20mm dollies attached when performing the calibration.

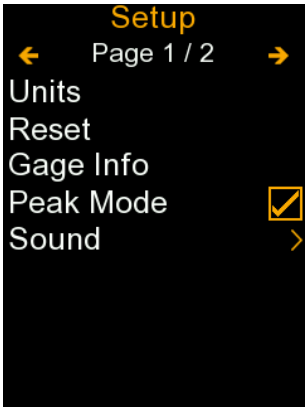
1.4 Connect the PosiTest AT actuator to the loading fixture of the PosiTest AT Calibrator. Push down on the actuator knob to make sure all pressure has been released. The actuator should easily move around on the loading fixture.

1.5 With the ATC probe connected to the PosiTector gage, press the center (menu) button to power-up the gage. Verify the ATC reads zero, Peak Mode is on, and the units are psi.



1.5.1 To zero the ATC, press the PosiTector menu button and select the “Zero” function.

1.5.2 To toggle the Peak Mode, press the PosiTector menu button then select “Setup” and select / de-select Peak Mode.



1.5.3 To change the units to psi, press the PosiTector menu button then select “Setup” and “Units”.

2 Calibration Process

2.1 Power on the PosiTest AT by pressing the green button. Ensure the units are set to psi and the dolly size is 20mm.

- PosiTest AT-A: Set the pull rate to 100 psi/sec
- PosiTest AT-M: Close the pressure relief valve (turn clockwise).

2.2 Press the green button again to start the test.

- PosiTest AT-A models will automatically begin building pressure.
- PosiTest AT-M: Slowly prime the pump until the priming pressure is reached (100 psi). Return the pump handle to its full upright position and maintain a single slow, continuous pump at approximately 100 psi/sec.

2.3 Stop the test when a target value is reached.

- PosiTest AT-A users press the red button, the reading will flash and automatically retract.
- PosiTest AT-M users release the pump handle and open the pressure relief valve (turn counter-clockwise).

Target Value (psi)
500
1000
1500
2000
2500
3000
3500*

* PosiTest AT-A’s with 2”x3” display only

2.4 Record the values from both the PosiTest AT and ATC.

2.5 For the next verification point:

- Push down on the actuator knob to make sure all pressure has been released.
- Press the “+” button on the PosiTector gage to reset the peak value.

- For PosiTest AT-M, close the pressure relief valve (turn clockwise).

2.6 Repeat steps 2.2 - 2.5 for each additional verification point.

2.7 Determine the PosiTest AT error by subtracting its reading from the ATC reading. Sample accuracy certificates are provided in Appendix A and B for reporting the results. Appendix A is for Positest AT-M and older version AT-A's. Appendix B is for the current AT-A (with 2"X3" display).

Appendix A

PosiTest AT Accuracy Certificate

Company Name: _____ Date Testing Performed:_____
Address: _____
_____
_____

Customer Name: _____
Address: _____
_____
_____

Product Description: PosiTest Adhesion Tester

Model number: _____

Serial number: _____

Accuracy: ± 30 psi

Laboratory Temperature: _____±_____^{o}C

Measurement conducted in accordance with procedure number: _____

Standard Measurement System Uncertainty: ± 5.6 psi

Target Reading (psi)*	PosiTest AT Reading (psi)	PosiTest ATC Reading (psi)	Error (psi)†	Pass/Fail
500				
1000				
1500				
2000				
2500				
3000				

* When configured for 20mm dolly
† PosiTest AT reading – PosiTest ATC reading

Measurement Performed By: _____

Title: _____

Measurement was performed using test equipment traceable to NIST. This calibration certificate shall not be reproduced except in full, without written permission from the calibration provider.

Appendix B

PosiTest AT-A Accuracy Certificate

Company Name: _____ Date Testing Performed:_____
Address: _____
_____
_____

Customer Name: _____
Address: _____
_____
_____

Product Description: PosiTest Adhesion Tester

Model number: AT-A

Serial number: _____

Accuracy: ± 35 psi

Laboratory Temperature: _____±_____°C

Measurement conducted in accordance with procedure number: _____

Standard Measurement System Uncertainty: ± 5.6 psi

Target Reading (psi)*	PosiTest AT Reading (psi)	PosiTest ATC Reading (psi)	Error (psi)†	Pass/Fai l
500				
1000				
1500				
2000				
2500				
3000				
3500				

* When configured for 20mm dolly
† PosiTest AT reading – PosiTest ATC reading

Measurement Performed By: _____
Title: _____

Measurement was performed using test equipment traceable to NIST. This calibration certificate shall not be reproduced except in full, without written permission from the calibration provider.

Appendix C

The accuracy of the PosiTest ATC is determined in the following manner:

Manufacturer's specifications for the maximum errors of the load cell are:

Non-linearity: 0.05 % FS (full scale)
Hysteresis: 0.03 % FS
Non-repeatability: 0.02 % FS

Full scale on the load cell is 2000 lbs and applying the surface area of the 20mm dolly (0.4869 in^2) this is equivalent to 4107 psi. With the 4107 psi FS value the load cell Non-linearity, Hysteresis and Non-repeatability errors become 2.0535, 1.2321 and 0.8214 psi respectively.

The error contributed to the measurement system by the electronics in the probe is 1.1 psi

Because the PosiTest ATC displays in 1 psi increments and performs standard rounding, an error of ± 0.5 psi is potentially contributed.

Performing a sum of squares on the system to determine the combined errors yields:

$$\pm (\text{Non-linearity}^2 + \text{Hysteresis}^2 + \text{Non-repeatability}^2 + \text{probe}^2 + \text{rounding}^2)^{1/2}$$
$$\pm (2.0535^2 + 1.2321^2 + 0.8214^2 + 1.1^2 + 0.5^2)^{1/2}$$
$$\pm (7.9)^{1/2}$$
$$\pm 2.8 \text{ psi}$$

Applying a K=2 coverage factor yields a potential error of ± 5.6 psi

Management Procedure Change Notice

Procedure Number: MP 2571
Revision Level: E
Date of Change:
Title: ATA, ATA20A-B, ATA50A-B, ATM, ATM20A, and ATM50A Calibration

Reason for Change: • Update for ATC
Description of Change: • Complete re-write

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

Printed Name	Signature	Date

Management Form 0010.02-05/1998