

## Calibration Procedure

### PosiTector SHD-A and SHD-D Shore Hardness Durometer Gages

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# 1 Introduction and UUC Performance Requirements

1.1 This procedure describes the calibration of DeFelsko Corporation PosiTector SHD-A and SHD-D probes and gages.

Table 1-1

Models	Measurement Range
SHD-A	0 – 100 Shore A
SHD-D	0 – 100 Shore D

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 (Spring Force)	Test Method
SHD-A	0 – 100 Shore A	± 1 (± 75 mN) (± 0.017 lb)	Compared to Reference Standards
SHD-D	0 – 100 Shore D	± 1 (± 444.5 mN)* (± 0.100 lb)	

Based on ASTM D2240-15

Table 2-2 Minimum Use Specification

Parameter	Range	Accuracy
Shore A Spring Force	0 – 100 (550 – 8050 mN) (0.124 1.810 lb)	± ¼ Duro (± 18.75 mN) (± 0.004 lb)
Shore D Spring Force	0 – 100 (0 – 44,450 mN)* (0 – 9.993 lb)	± ¼ Duro (± 111.13 mN) (± 0.025lb)

Table 2-3 Actual Equipment Specification

Parameter	Range	Accuracy	Manufacturer/Model #’s Applicable
Shore A Spring Force	0 – 100 (550 – 8050 mN) (0.124 – 1.810 lb)	$\pm 1/4$ ( $\pm 17.8$ mN) ( $\pm 0.004$ lb)	DeFelsko SHD Verifier
Shore D Spring Force	0 – 100 (0 – 44,482 mN) (0 – 10.000)	$\pm 1/25$ ( $\pm 17.8$ mN) ( $\pm 0.004$ lb)	DeFelsko SHD Verifier

**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: $23 \pm 2^\circ$ C. Relative Humidity: 40 - 60%
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:

- Sticky or rough probe motion
- probe tip wear or damage (use a microscope with at least 20x magnification)
- Dirty or damaged probe base plate

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

**Note:** When using a Type D durometer do not measure on hard surfaces, such as glass, or you will damage the tip.

#### 3.2 For product returned for service, ensure the gage has been updated with the most recent firmware.

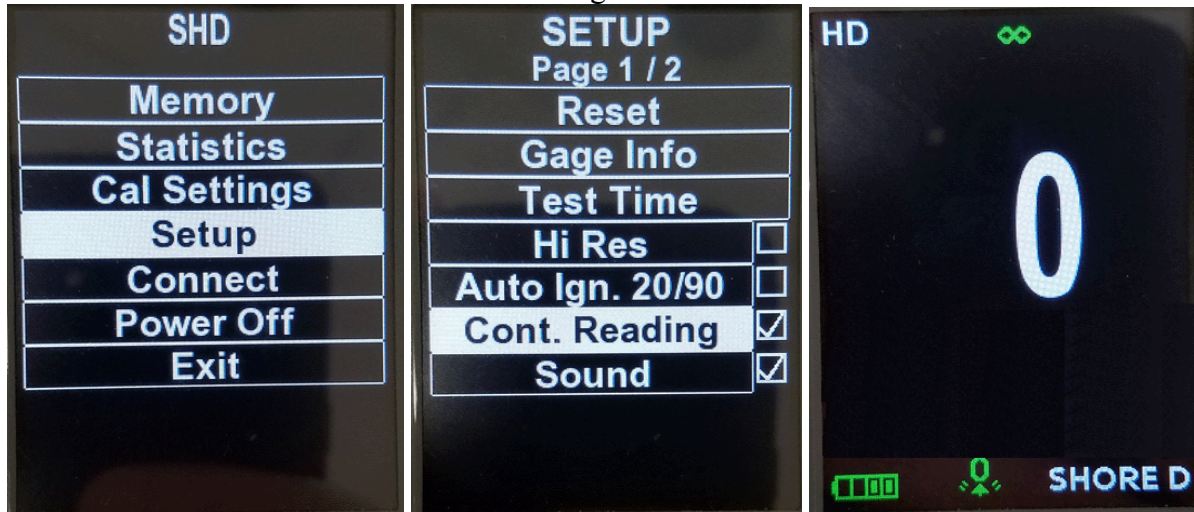
#### 3.3 Gage Set-up

##### 3.3.1 Gage Reset: When the unit is powered down, simultaneously hold the “+” and middle buttons until the reset symbol (2 arrows) appears.

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

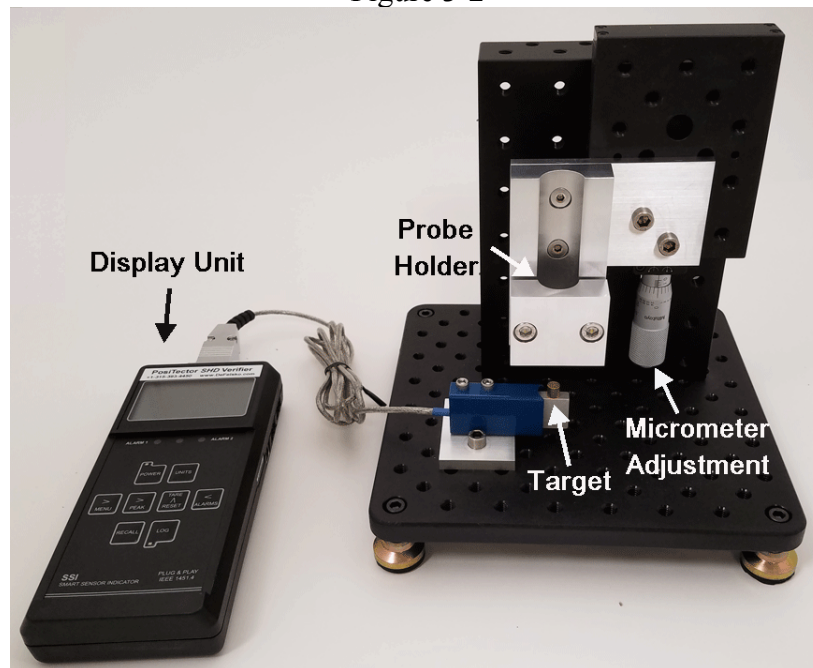
- 3.3.2 Use the menu button and navigation keys to navigate to the “Setup” menu then select “Cont. Reading”. Once continuous reading mode is activated the “∞” symbol will show on the gage screen.

Figure 3-1



- 3.4 Test Set-Up

Figure 3-2



- 3.5 Confirm the appropriate target is on the SHD Verifier, aluminum for type A and brass for Type D.

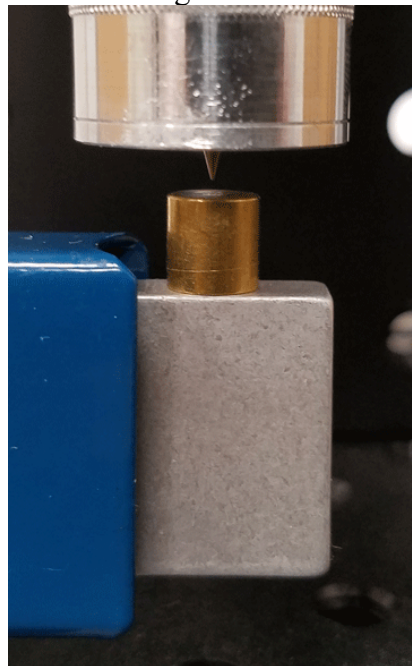
- 3.6 Make sure the micrometer adjustment is turned so it is set between 1 and 2.

Figure 3-3



- 3.7 Place the UUC into the probe holder so that the tip is near but not touching the target and tighten the screws using a 3/16" Hex wrench. Do not overtighten the screws.

Figure 3-4



- 3.8 Turn on the SHD Verifier display unit and verify it reads zero. Press the "Tare/Reset" button if the display doesn't show zero.

#### 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 Turn the micrometer adjustment to lower the UUC into contact with the target. Continue to lower the UUC until the desired load is displayed on the SHD Verifier as indicated in the tables below. Record the UUC reading at each of the loads.

Note: For best accuracy record the reading displayed when you are not touching the SHD Verifier

Figure 4-1

Shore A	10	20	30	40	50	60	70	80	90
SHD Verifier	0.292	0.461	0.629	0.798	0.967	1.135	1.304	1.472	1.641
Display lbs (N)	(1.30)	(2.05)	(2.80)	(3.55)	(4.30)	(5.05)	(5.80)	(6.55)	(7.30)

Shore D*	10	20	30	40	50	60	70	80	90
SHD Verifier	0.999	1.999	2.998	3.997	4.996	5.996	6.995	7.994	8.994
Display lbs (N)	(4.45)	(8.90)	(13.35)	(17.80)	(22.25)	(26.70)	(31.15)	(35.60)	(40.05)

\*Based on ASTM D2240-15, 0.4445 N/durometer. ISO 18898 indicates 0.4450 N/durometer.

Alternatively any SHD Verifier value can be converted to a durometer reading using the following formulas:

$$\text{Shore A} = (F - 0.1236 \text{ lbs}) / 0.0169 \text{ lbs}$$

$$\text{Shore D}^* = F / 0.0999 \text{ lbs}$$

Where F is the SHD Verifier reading in pounds.

For example: A SHD Verifier reading of 1.205 lbs is:

$$(1.205 - 0.1236) / 0.0169 = 63.988 \text{ shore A}$$

$$(1.205 / 0.0999) = 12.062 \text{ shore D}$$

4.3 Once you reach the highest value, raise the UUC until it is no longer in contact with the target and repeat step 4.2. Continue this process to achieve three readings for each shore value.

4.4 Average the 3 readings and verify they are within the tolerance listed in table 5-1.

4.5 Loosen the screws on the probe holder to remove the probe.

## 5 Performance Requirements

Table 5-1 Performance Requirements and Calibration Data  
for PosiTector SHD-A and SHD-D

Shore Value	Tolerance	UUC Reading			Average
		1	2	3	
10	±1				
20	±1				
30	±1				
40	±1				
50	±1				
60	±1				
70	±1				
80	±1				
90	±1				

*Note:* Do not write in this procedure.

Management Procedure Change Notice

Procedure Number: MP 2555

Revision Level: B

Date of Change: August 22, 2017

Title: Calibration Procedure, PosiTector SHD-A and SHD-D  
Shore Hardness Durometer Gages

Reason for Change: <ul style="list-style-type: none"><li>• Implemented SHD Verifier</li></ul>
Description of Change: <ul style="list-style-type: none"><li>• Changed uncertainty ration in 2.2 from 2:1 to 4:1</li><li>• Updated tables 2-2 and 2-3</li><li>• Re-wrote sections 3 and 4</li></ul>

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

Printed Name	Signature	Date

Management Form 0010.02-05/1998