

## Calibration Procedure

DeFelsko Corporation

## Certified Shims

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# 1 Introduction and UUC Performance Requirements

1.1 This procedure describes the calibration of Certified Shims with the following ranges:

Table 1-1 Measurement Ranges

Type	Measurement Range
Certified Shim	25 - 1500 $\mu\text{m}$ (1 - 60 mils)

1.2 The shim 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.

Table 2-1 UUC Accuracy Requirements and Description

UUC Function	Range	Accuracy	Test Method
Plastic Shim	25 - 1500 $\mu\text{m}$ (1 - 60 mils)	$\pm 2 \mu\text{m}$ ( $\pm 0.08$ mils)	Height Gage

Table 2-2 Minimum Use Specification

Parameter	Range	Accuracy
Height	0 - 1500 $\mu\text{m}$ (0 - 60 mils)	$\pm 0.5 \mu\text{m}$ ( $\pm 0.02$ mils)

Table 2-3 Actual Equipment Specifications

Equipment Generic Name	Range	Accuracy	Manufacturer/Model #’s Applicable
Height Gage	0 - 25.4 mm (0 - 1’)	$\pm 0.10 \mu\text{m}$ ( $\pm 0.004$ mils)	Heidenhain CT2501 with ND 287 display

**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: $23 \pm 5^\circ\text{C}$ Relative Humidity: Less Than 95%
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Measurement Standards & Support Equipment Warm-up and Stabilization Requirements:	Not required
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### 3 Preliminary Operations

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

#### 3.1 Visually inspect the UUC for:

- Damage
- Wear
- Burrs

3.2 Damaged or excessively worn shims shall be discarded and replaced.

3.3 Use a Q-tip and water (if necessary) to clean the top and bottom surfaces of the UUC. Alcohol can remove the colored coating of the shims so only use water.

3.4 Ensure the indicator has been properly zeroed.

### 4 Calibration Process

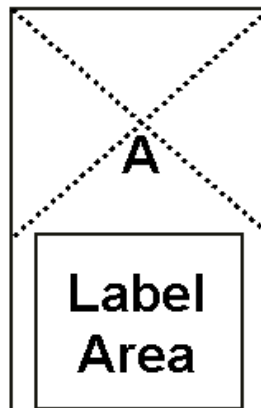
*Note:* Whenever the test requirement is not met, verify the results of each test and take corrective action before- proceeding.

4.1 Review the Performance Requirements Table 6-1.

4.2 Make sure the UUC and gage surfaces are clean then take five measurements of the UUC. Make sure the UUC is sitting flat on the measurement surface. Express all readings in microns. Convert from millimeters to microns by multiplying by 1000.

*Note:* In making readings the probe tip shall be centered on point A of the UUC as shown below.

Figure 4-1



- 4.3 Determine the average of the five readings, rounding to the nearest 0.1 micron (0.0001mm). Verify that the individual readings are within the allowable limits shown in columns C and D of Table 6-1. Enter the average thickness value in microns on the DeFelsko Standard label as shown below.

Figure 4-2

<b>DeFelsko</b> CORPORATION	
S/N:	10005
20.005	mils
509.0	microns

- 4.4 Calculate the thickness value in mils by dividing the micron value by the constant 25.4 (1mil = 25.4 microns) and rounding to the nearest 0.005 mils. Enter the mils value on the label in the proper location.
- 4.5 Apply the label to the UUC aligning it as shown in Figure 4-1.

*Note:* Be sure to place the label at the correct end of the UUC (the one opposite where the readings were taken).

- 4.6 Repeat for all the shims.
- 4.7 Record the serial number and average thickness readings in microns and mils on the Calibration Certificate.

*Note:* Record two decimal points for readings in mils and no decimal for microns.

## 5 Recertification Process

- 5.1 Record the thickness in microns from the UUC label in table 6-2 and review the performance requirements of Table 6-2.
- 5.2 Make sure the UUC and gage surfaces are clean then take five readings on the UUC in microns using the indicator. Make sure the UUC is sitting flat on the measurement surface.

*Note:* In taking readings the probe tip will be centered on the UUC as shown in Figure 4-1.

- 5.3 Verify that the individual readings are within the allowable limits shown in columns C and D of Table 6-2.
- 5.4 Record the serial number and average thickness readings in microns and mils on the Calibration Certificate.

## 6 Performance Requirements

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

Table 6-1 Performance Requirements and Calibration Data for New Certified Shims

Individual Readings (microns)					Average (microns)	Min. Reading Allowed <sup>①</sup> (microns)	Max. Reading Allowed <sup>②</sup> (microns)
A					B	C	D

\* For imperial readings convert using 1 mil = 25.4 microns

① Calculation: B – 2 microns

② Calculation: B + 2 microns

**Note:** The technician shall collect the data needed to complete column B of the table below. Do not write in this procedure.

Table 6-2 Performance Requirements and Re-certification Data for Certified Shims

Certified Shim Thickness (microns)	Individual Readings (microns)					Min. Reading Allowed <sup>①</sup> (microns)	Max. Reading Allowed <sup>②</sup> (microns)
A	B					C	D

\* For imperial readings convert using 1 mil = 25.4 microns

① Calculation: A – 2 microns

② Calculation: A + 2 microns

