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Supersedes: 12-Jul-2018

Effective: 3-Dec-2024

## 1.0 Purpose

- 1.1 This procedure establishes the measurement requirements to determine the accuracy, range of use and required number of points to be used in the calibration of Non-Destructive Testing equipment by an outside vendor.

## 2.0 Reference Documents

- 2.1 MT-20, Meyer Tool Quality Control Manual
- 2.2 ISO 10012-1, Calibration System Requirements
- 2.3 ANSI/NCSL Z540-1 American Standard for Calibration/Calibration laboratories and Measuring and Test Equipment – General Requirements
- 2.4 PI-157 Purchasing procedure
- 2.5 QP-105 Radiographic procedure
- 2.6 QP-106 Computed Radiographic procedure
- 2.7 QP-107 Liquid Penetrant procedure
- 2.8 QP-112 Digital Radiography procedure
- 2.9 QP-148 Computer Tomography Procedure

## 3.0 General

- 3.1 The following calibration requirements are for use by our approved external suppliers for calibration use only. Internal calibration will be completed in accordance with the appropriate procedures.
- 3.2 All equipment calibrated shall be calibrated to traceable national measurement standards (SI or NIST is acceptable).
- 3.3 This procedure will be used in conjunction with QP-105, QP-106 and QP-107 and QP-112.

## 4.0 Equipment

- 4.1 Light Meters

- 4.1.1 Spectronics Radiometer

Model: DSE-100X – Read out unit

Calibrated at 3 set points: 2mV, 100mV and 180 mV

Accuracy:  $\pm 5\%$

Calibration Interval: 6 months

Standards: Traceable to NIST, ANSI/NCSL Z540-1, ISO 10012-1

Date		Prepared by	Justin Andre
Date		Approved	Justin Andre Level III
Date		Approved	Bridget Nolan

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DIX – 555A – Visible Light Sensor  
 Calibrated at 3 set points: 2fc, 100fc and 180fc  
 Range of use: 0fc to 199fc

DIX – 365 - UV A Sensor  
 Calibrated at 3 set points: 200 $\mu$ W/cm<sup>2</sup>, 2000 $\mu$ W/cm<sup>2</sup> and 7000 $\mu$ W/cm<sup>2</sup>  
 Range of use: 200 $\mu$ W/cm<sup>2</sup> to 3000 $\mu$ W/cm<sup>2</sup>

#### 4.1.2 Spectronics Radiometer/Photometer

Model: XR – 1000 – Read out unit  
 Calibrated in footlamberts at 4 set points: 500 fl, 25000 fl, 50000 fl and 200000 fl  
 Accuracy:  $\pm$  5%  
 Calibration Interval: 6 months  
 Standards: Traceable to NIST, ANSI/NCSL Z540-1, ISO10012-1

XDS-1000 – Dual Sensor  
 White Light sensor  
 Calibrated in foot candles at 4 set points: 2 fc, 50 fc, 100 fc and 490 fc  
 Range of use: 0 fc to 300 fc

UV Sensor  
 Calibrated using 4 set points: 200  $\mu$ W/cm<sup>2</sup>, 2000  $\mu$ W/cm<sup>2</sup>, 4000  $\mu$ W/cm<sup>2</sup> and 7000  $\mu$ W/cm<sup>2</sup>  
 Range of use: 200  $\mu$ W/cm<sup>2</sup> to 7000  $\mu$ W/cm<sup>2</sup>

XS – 555/L – Luminance Sensor Detector  
 Calibrated in footlamberts at 4 set points: 500 fl, 25000 fl, 50000 fl and 200000 fl  
 Range of use: 500 fl to 200000 fl

XS – 555/L – Luminance Sensor Detector  
 Calibrated in Candelas/m<sup>2</sup> at 5 set points: 0 cd/m<sup>2</sup>, 100 cd/m<sup>2</sup>, 200 cd/m<sup>2</sup>, 300cd/m<sup>2</sup>, and 400 cd/m<sup>2</sup>  
 Range of use: 0 – 1,000,000 cd/m<sup>2</sup>

#### 4.1.3 Gould Bass Radiometer with Luminance Sensor

Model: DLM-1000  
 Calibrated at 4 set points: 500fl, 25000fl, 50000fl and 200000fl  
 Accuracy:  $\pm$  5%  
 Calibration Interval: 6 months  
 Standards: Traceable to NIST, ANSI/NCSL Z540-1, ISO10012-1  
 Range of use: 0 fl to 150000 fl  
 Footlambert sensor: 0915028F  
 Calibrated at 4 set points: 500fl, 25000fl, 50000fl and 200000fl  
 Range of use: 0 fl to 150000 fl  
 Footcandle sensor: 0915028C  
 Calibrated at 5 set points: 0fc, 50 fc, 200 fc, 350 fc and 490 fc  
 Range of use 0 fc to 490 fc

### 4.2 Water Temperature Gages

4.2.1 Model: Dial Thermometer  
 Calibrated at 4 set points: 50°F, 80°F, 120°F and 160°F  
 Accuracy:  $\pm$  2%  
 Calibration Interval: 6 months  
 Standards: Traceable to NIST, ANSI/NCSL Z540-1, ISO 10012-1, ISO/IEC 17025  
 Range of use: 50°F to 100°F

### 4.3 Pressure Gages

4.3.1 Model: 0-15 PSI Pressure gage

- Calibrated at 4 set points: 3, 6, 9 and 12 PSI
    - Accuracy:  $\pm .3$  PSI
    - Calibration Interval: 6 Months.
    - Standards: Traceable to NIST, ISO 10012-1, ISO/IEC 17025, Mil-Std-45662A
    - Range of Use: 0 to 5 PSI
  - 4.3.2 Model: 0-30 PSI Pressure gage
    - Calibrated at 4 set points: 6, 12, 18 and 24 PSI
    - Accuracy:  $\pm .6$  PSI
    - Calibration Interval: 6 Months.
    - Standards: Traceable to NIST, ISO 10012-1, ISO/IEC 17025, Mil Std-45662A
    - Range of Use: 0-25 PSI
  - 4.3.3 Model: 0-100 PSI Pressure gage
    - Calibrated at 4 set points: 20, 40, 60 and 80 PSI
    - Accuracy:  $\pm 2$  PSI
    - Calibration Interval: 6 Months.
    - Standards: Traceable to NIST, ISO 10012-1, ISO/IEC 17025, Mil-Std-45662A
    - Range of Use: 0-40 PSI
- 4.4 Refractometer
  - 4.4.1 Model: ATAGO N1-e Refractometer
    - Calibrated at 5 set Points: 1%, 5%, 10%, 20% and 30% Brix.
    - Accuracy:  $\pm .2\%$
    - Range of Use: 0 to 10 Brix.
    - Calibration Intervals: 6 months
    - Standards: ISO 10012-1, ANSI/NCCL Z540-1
- 4.5 Personal Monitoring Devices
  - 4.5.1 Dosimeter
    - 4.5.1.1 Model: 138
      - Range of Use: 0-200mR
      - Calibrated at 3 set points: 0, 100 and 200mR
      - Accuracy:  $\pm 5\%$
      - Calibration Intervals: Annually
      - Standards: Traceable to NIST, ISO 10012-1, ISO/IEC 17025, Mil-Std-45662A
  - 4.5.2 Rate Alarms:
    - 4.5.2.1 Model: RA-500
      - Range of Use: 0-1000mR
      - Calibrated at 3 set points: 0, 500 and 1000mR
      - Accuracy:  $\pm 5\%$
      - Calibration Intervals: Annually
      - Standards: Traceable to NIST, ISO 10012-1, ISO/IEC 17025, Mil-Std-45662A
  - 4.5.3 Survey Meters:
    - 4.5.3.1 Models: ND-2000 series or Victoreen
      - Range of Use: 0-1000mR/hr
      - Calibrated at 3 set points: 0-10mR/hr, 0-100mR/hr and 1000mR/hr
      - Accuracy:  $\pm 5\%$
      - Calibration Intervals: 6 months
      - Standards: Traceable to NIST, ISO 10012-1, ISO/IEC 17025, Mil-Std-45662A
- 4.6 Tam Panels
  - 4.6.1 Tam Panels are calibrated in accordance with QP-107
  - 4.6.2 Calibration intervals: Annually



- 4.7 Densitometers
  - 4.7.1 Densitometers are calibrated in accordance with CP-132
  - 4.7.2 Calibration Intervals: Quarterly
- 4.8 Dryer Ovens
  - 4.8.1 Dryer ovens are calibrated in accordance with CP-115
  - 4.8.2 Calibration Intervals: Quarterly
- 4.9 Timers
  - 4.9.1 Timers are calibrated in accordance with CP-120
  - 4.9.2 Calibration Intervals: Annually

## **5.0 Out of Tolerance Condition**

- 5.1 Any Calibration that exceeds the  $\pm$ value specified in section 4.0 of this procedure shall be considered “OUT OF TOLERANCE” and removed from service or ban from entering service.
- 5.2 If a calibration fails to conform to a specified requirement the calibration department will refer to Quality Manual MT-20 for further action to be taken.

### Revision History

Rev. Ltr.	Parg.	Description of Revision	Date Rev.	Rev. By
Orig.	All	New procedure	5-Oct-09	D. Olson
A	4.3.1, 4.3.2, 4.3.3	Added Calibration Interval: 6 months	19-Jul-10	D. Olson
A	4.6.1	Changed QP-107 to PI-224 and added Calibration Intervals: annually.	19-Jul-10	D. Olson
A	4.7.1	Added: Calibration Intervals: Quarterly.	19-Jul-10	D. Olson
A	4.8.1	Added: Calibration Intervals: Quarterly.	19-Jul-10	D. Olson
B	4.6	Replaced PI-224 with QP-107	22-Nov-11	D. Olson
C	2.8	Added QP-112	24-Jul-13	A. Powers
C	3.2	Added QP-112	24-Jul-13	A. Powers
C	4.1.2	Changed number of set points, added 25000 fl, and added requirements for candela readings	24-Jul-13	A. Powers
C	4.1.3	Corrected model #, added s/n's for the sensors and added footcandle requirements	24-Jul-13	A. Powers
D	4.1.2	Added s/n for the dual sensor and requirements	8-Jan-15	A. Powers
E	All	Formatting throughout	12-Jul-2018	A. Powers
E	All	Replaced & with "and"	12-Jul-2018	A. Powers
E	2.4-2.8	Removed "Meyer Tool"	12-Jul-2018	A. Powers
E	2.9	Added CT procedure	12-Jul-2018	A. Powers
E	3.2	Added	12-Jul-2018	A. Powers
E	4.2.1	Corrected abbreviation for Fahrenheit	12-Jul-2018	A. Powers
E	4.9.2	Changed to "annually" from "quarterly"	12-Jul-2018	A. Powers
F	4.1.2	Changed 180 to 490 fc	2-Dec-2024	J. Andre
F	4.1.2	Changed range of use from 180 to 300 fc	2-Dec-2024	J. Andre
F	4.1.3	Changed 150000 to 200000fl	2-Dec-2024	J. Andre
F	4.1.3	Changed 180 to 490 fc	2-Dec-2024	J. Andre
F	4.1.3	Changed range from 500 to 490 fc	2-Dec-2024	J. Andre
G	4.2.1	Changed from 40 to 50	3-Dec-2024	J. Andre