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: ± 5%
Calibration Interval: 6 months
Standards: Traceable to NIST, ANSI/NCSL Z540-1, ISO 10012-1

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: 200µW/cm², 2000µW/cm² and 7000µW/cm²
Range of use: 200µW/cm² to 3000µW/cm²

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: ± 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 180 fc
Range of use: 0 fc to 180 fc

UV Sensor
Calibrated using 4 set points: 200 µW/cm², 2000 µW/cm², 4000 µW/cm² and 7000 µW/cm²
Range of use: 200 µW/cm² to 7000 µW/cm²

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/m² at 5 set points: 0 cd/m², 100 cd/m², 200 cd/m², 300cd/m², and 400 cd/m²
Range of use: 0 – 1,000,000 cd/m²

4.1.3 Gould Bass Radiometer with Luminance Sensor

Model: DLM-1000
Calibrated at 4 set points: 000fl, 25000fl, 50000fl and 150000fl
Accuracy: ± 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: 000fl, 25000fl, 50000fl and 150000fl
Range of use: 0 fl to 150000 fl
Footcandle sensor: 0915028C
Calibrated at 5 set points: 0fc, 50 fc, 200 fc, 350 fc and 500 fc
Range of use 0 fc to 500 fc

4.2 Water Temperature Gages

4.2.1 Model: Dial Thermometer
Calibrated at 4 set points: 40°F, 80°F, 120°F and 160°F
Accuracy: ± 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: ± .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: ± .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: ± 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: ±.2%
Range of Use: 0 to 10 Brix.
Calibration Intervals: 6 months
Standards: ISO 10012-1, ANSI/NCSL 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: ± 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: ± 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: ± 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 ±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 candelas 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