



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005  
& ANSI/NCSL Z540-1-1994

TROXLER ELECTRONICS LABORATORIES, INC.  
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CALIBRATION

Valid until: April 30, 2018

Certificate Number: 3260.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2</sup>	Comments
Calibration of 114.3 mm Nominal Height Standards Used for Gyrotory Compactor Calibration	(114.0 to 115.0) mm	0.012 mm	CMM
Calibration of Angle Fixture for Dynamic Angle Verification Kit (DAV)	-1.400° to 1.400°	2.4 x 10 <sup>-3</sup> °	CMM
Calibration of Dynamic Angle Verification Kit (DAV)	-1.380° to 1.380°	0.11°	Angle fixture for dynamic angle verifier

Parameter/Equipment	Range	CMC <sup>2</sup>	Comments
Calibration of Height Measurement System of the Gyrotory Compactor <sup>3</sup>	(113 to 115) mm	0.078 mm	Troxler gyrotory compactor height standard
Calibration of Angle Measurement System of the Gyrotory Compactor using the DAV <sup>3</sup>	1.0° to 1.3°	0.14°	Dynamic angle verifier
Calibration of Angle Measurement System of the Gyrotory Compactor using the RAM <sup>3</sup>	1.0° to 1.3°	$2.1 \times 10^{-2} \text{ }^\circ$	RAM
Gyrotory compactor Mold Internal Diameter <sup>3</sup>	(149.0 to 151.0) mm	$1.0 \times 10^{-2} \text{ mm}$	Bore micrometer
Gyrotory Compactor Ram Head and End Plate External Diameter <sup>3</sup>	(149.0 to 150.0) mm	$1.8 \times 10^{-2} \text{ mm}$	External micrometer
Gyrotory Compactor Mold Height	(245.0 to 255.0) mm	0.014 mm	CMM
Gyrotory Compactor Mold Wall Thickness	(7.0 to 8.0) mm	0.13 mm	CMM

Parameter/Equipment	Range	CMC <sup>2</sup>	Comments
Gyratory Compactor Mold Inside Surface, Ram Head and End Plate Surface Rq Value	(0.00 to 5.00) $\mu\text{m}$	0.20 $\mu\text{m}$	Surface texture tester
AFLS1 Rapid Internal Angle Measurement Calibration Tube, Dihedral Angle	1.0° to 1.3°	$1.3 \times 10^{-2} \text{ }^\circ$	CMM
Calipers <sup>3</sup>	Up to 12 in	$1.1 \times 10^{-4}$ in	Gage blocks
Micrometers <sup>3</sup>	Up to 12 in	$1.1 \times 10^{-4}$ in	Gage blocks

## II. Mechanical

Parameter/Equipment	Range	CMC <sup>2,4</sup>	Comments
Calibration of Rotational Frequency of the Gyratory Compactor <sup>3</sup>	(0 to 35) RPM	0.15 RPM	Laser tachometer
Density –  Primary Density Blocks	(1760 to 2725) $\text{kg}/\text{m}^3$	0.015 % rdg	CMM, weight determinations
Secondary Density Blocks <sup>3</sup>	(1760 to 2725) $\text{kg}/\text{m}^3$	0.38% rdg	Master gauge
Troxler Tracker Portable Gauge Calibration System <sup>3</sup>	(1740 to 2620) $\text{kg}/\text{m}^3$	$(7.4 \times 10^{-6}D^2 - 3.6 \times 10^{-3}D + 0.68)$ % rdg	Master gauge

Parameter/Equipment	Range	CMC <sup>2,4</sup>	Comments
Water Mass Per Unit Volume –			
Secondary Moisture Blocks	(370 to 823) kg/m <sup>3</sup>	0.49 % rdg	Master gauge
Tertiary Moisture Blocks <sup>3</sup>	(555 to 615) kg/m <sup>3</sup>	1.5% rdg	Master gauge
Troxler Tracker Portable Gauge Calibration System <sup>3</sup>	(110 to 375) kg/m <sup>3</sup>	1.5% rdg	Master gauge
Master Gauge Calibration, Density Measurement System	(1760 to 2725) kg/m <sup>3</sup>	0.22 % rdg	Primary density blocks
Master Gauge Calibration, Water Mass Per Unit Volume Measurement System	(555 to 615) kg/m <sup>3</sup>	1.1 % rdg	Secondary water blocks
Client Surface Moisture/Density Gauges, Density Measurement System <sup>3</sup> –			
Backscatter	(1740 to 2626) kg/m <sup>3</sup>	1.3 % rdg	Secondary density blocks
Other Positions	(1740 to 2626) kg/m <sup>3</sup>	$(1.9 \times 10^{-5}D^2 - 0.0058D + 1.1)$ % rdg	
Backscatter	(1850 to 2550) kg/m <sup>3</sup>	1.6 % rdg	Troxler tracker portable gauge calibration system
Other Positions	(1740 to 2620) kg/m <sup>3</sup>	$(-2.5 \times 10^{-3}D + 2.1)$ % rdg	

Parameter/Equipment	Range	CMC <sup>2,4</sup>	Comments
Client Surface Moisture/Density Gauges, Moisture System <sup>3</sup>	(0 to 615) kg/m <sup>3</sup>	3.4 % rdg	Tertiary moisture blocks
	(0 to 375) kg/m <sup>3</sup>	3.4 % rdg	Troxler tracker portable gauge calibration system
Client Thin Layer Density Gauges <sup>3</sup> –  For Low Density Top Layer, High Density Bottom Layer  For High Density Top Layer, Low Density Bottom Layer	Density: (1740 to 2585) kg/m <sup>3</sup> Top Layer Thickness: (25.4 to 101.6) mm  Density: (1740 to 2585) kg/m <sup>3</sup> Top Layer Thickness: (25.4 to 101.6) mm	(0.0030T <sup>2</sup> - 0.25T + 9.5) % rdg  (0.00158T <sup>2</sup> - 0.131T + 4.3) % rdg	Secondary density blocks and primary thin layer plates
Calibration of Load Cell for Gyratory Compactor Pressure Calibration	(790 to 5010) lbf	4.8 lbf	Force gauge
Calibration of Pressure System of the Gyratory Compactor <sup>3</sup>	(590 to 610) kPa	3.6 kPa	Load cell

Parameter/Equipment	Range	CMC <sup>2</sup>	Comments
Electronic Balance <sup>3</sup>	1500 g to 30 kg	0.00012 % of applied load	Dead weights
Rockwell C Hardness of Gyratory Mold, End Plate, and Ram	(45 to 70) Rockwell C Hardness	1.6 Rockwell C Hardness	Hardness meter

<sup>1</sup> This laboratory offers commercial calibration service calibration service and field calibration service.

<sup>2</sup> Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

<sup>3</sup> Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

<sup>4</sup> In the statement of CMC,  $D$  is the gauge measurement depth in millimeters,  $T$  is the top layer thickness in millimeters.





## Accredited Laboratory

A2LA has accredited

### TROXLER ELECTRONIC LABORATORIES, INC.

*Research Triangle Park, NC*

for technical competence in the field of

### Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSLI Z540-1-1994 and any additional program requirements in the field of calibration. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).



Presented this 18<sup>th</sup> day of May 2016.

A handwritten signature in blue ink, appearing to read "J. C. Bunt".

Senior Director of Quality and Communications  
For the Accreditation Council  
Certificate Number 3260.01  
Valid to April 30, 2018

*For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.*