SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

RUDOLPH RESEARCH ANALYTICAL
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Hackettstown, NJ 07840
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CALIBRATION

Valid To: November 30, 2025 Certificate Number: 7528.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 5]:

I. Dimensional

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Quartz Control Plates (546.2271 nm)[6]	(-41 to < -30) ° (-30 to 41) °	0.0030 ° 0.0020 °	Indirect comparison to standard quartz control plate
Polarimeters (546 nm, 589 nm, 633 nm)[3]	(-41 to -29) ° (> -29 to -24) ° (> -24 to -15) ° (> -15 to -4) ° (> -4 to 4) ° (>4 to 16) ° (>16 to 24) ° (>24 to 29) ° (>29 to 32) ° (>32 to 39) ° (>39 to 41) °	(-0.000 13α + 0.0018) ° (-0.000 12α + 0.0016) ° (-0.000 11α + 0.0018) ° (-0.000 07α + 0.0024) ° 0.0026 ° (0.000 07α + 0.0024) ° (0.000 11α + 0.0018) ° (0.000 12α + 0.0016) ° (0.000 13α + 0.0013) ° (0.000 13α + 0.0014) ° (0.000 14α + 0.0011) °	Direct comparison to quartz control plate
Specific Rotation of Liquids	(-30 to 41) °	0.0069° Uncertainty is dependent on fluid identity	Indirect comparison to quartz control plates and liquid density standards

II. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Density – Density Meters[3]	(0.65 to 1.8) g/cm^3	0.000 011 g/cm^3	Indirect comparison to liquid reference standards
Liquid Density	(0.65 to 1.8) g/cm^3	0.000 019 g/cm^3 Uncertainty is dependent on fluid identity	Indirect comparison to liquid reference standards

III. Optical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Refractive Index	(0 to 67.5) % (m/m)	0.0064 % (m/m) Uncertainty is dependent on mass fraction	Gravimetric formulation
	Refractive index of: 1.332 986 to 1.459 413 based on % (m/m)	0.000 012 Uncertainty is dependent on mass fraction	Refractive index calculated from mass fraction according to ICUMSA SPS-3 (2000)

IV. Thermodynamics

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Temperature – Measuring Equipment	(20 to 30) °C	0.007 °C	Direct comparison to Fluke 5642 probe with 1504 meter

[1] This laboratory offers commercial calibration services and field calibration services.

[2] 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. CMC's 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.

[3] Field calibration service is available for this calibration. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the Calibration and Measurement Capability Uncertainty (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 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.

[4] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

[5] This scope meets A2LA's *P112 Flexible Scope Policy.*

[6] Optical rotation values for other wavelengths provided in accordance with the formula ICUMSA SPS-1

[7] In the statement of CMC, α is the measured angle of rotation.

Accredited Laboratory

A2LA has accredited

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for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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 April 2017*).

Presented this 20th day of February 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7528.01
Valid to November 30, 2025

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