National Research Council Canada
Institute for National Measurement Standards

Conseil national de recherches Canada
Institut des étalons nationaux de mesure

Calibration Laboratory Assessment Service

CLAS Certificate Number 94-02

Stephens Analytical, Inc.
Instrument Calibration and Standards Laboratory
2750 Brabant-Marineau
Montréal, Québec H4S 1L1

Contact: Don Sutherland

Tel (514) 332-1230
Toll free (800) 267-7474
Fax (514) 335-6566
E-mail don@stephens-analytical.com

Clients Served: All interested parties

Field of Calibration: Humidity

SCC Accreditation: Accredited Laboratory No. 44
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This scope of calibration capabilities is published by the CLAS program of the National Research Council of Canada (NRC) in close co-operation with the PALCAN program of the Standards Council of Canada (SCC), Canada's accreditation body for calibration and testing laboratories. The SCC accredits the capability of the named laboratory for being able to perform the listed calibrations at the given Best Measurement Capability (see Supplementary Notes C and D) with traceability to the International System of Units (SI) or to standards acceptable to the CLAS program.

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Type I Capability		
Measured Quantity & Range or Instrument	Best Measurement Capability expressed as an Uncertainty (±) (see Supplementary Notes)	Remarks
HUMIDITY		
Dew Point Temperature		
0 °C to 95 °C	± 0.4 °C	See Notes 1, 2 and 3
Frost Point Temperature		
- 19 °C to 0 °C	± 0.4 °C	See Notes 1, 2 and 3
Volume Ratio V; ppm(V)		
0.02 to 1	± 0.02 ppm(V)	See Notes 1, 2, 3 and 4
1 to 1200	± 2 % of reading	

MCM and Stephens Analytical, Inc provide
traceable moisture calibrations to ±20 ppb[V],
through diffusion cell Prime Generators.

NRC · CNRC

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Notes

1 There are many units in common use for describing the amount of moisture in a gas. Each industry has it's own preferred unit of measure for moisture. These units fall into two classes, concentration units and temperature units. It is always possible to convert from one concentration unit to another by multiplying by a conversion factor. Conversion from one temperature scale to another is also straightforward.

2 Conversion from a temperature scale to a concentration scale must be done using vapour pressure tables. For accurate work, corrections for pressure and temperature are also necessary. These conversions are best done using tables, charts or computer programs.

3 The user should be aware that chilled mirror hygrometers measure the condensation temperature and that the calculation of the corresponding moisture concentration is valid only if the condensing phase is pure water. Furthermore, the user must also recognize that there is significant difference in the moisture concentration associated with a frost and a dew formed on a mirror at the same temperature. It is common to use the terms dew point and frost point interchangeably. In general, regardless of the terminology used, dew points are implied above 0 °C and frost points are implied below 0 °C, unless stated otherwise.

4 A volume ratio of 0.02 ppm (V) is equivalent to a frost point of -98.2 °C.

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Supplementary Notes

A. Calibration capabilities are traceable to the national measurement standards of Canada held or accepted by the National Research Council (NRC) or, with the agreement of NRC, to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

B. Laboratories are certified by the NRC=s Calibration Laboratory Assessment Service (CLAS) for one or more of the following capabilities:

Type I: A capability of which the primary purpose is the calibration of measurement standards for other calibration laboratories. A laboratory with this type of capability has the appropriate reference standards, working standards, check standards, and calibration systems to be able to assess dynamically and to quantify its measurement uncertainty, and is able to monitor its measurement processes continually. The environmental conditions that affect the laboratory=s measurements are closely monitored and controlled. A laboratory with this type of capability usually reports a measurement value accompanied by a comprehensive statement of uncertainty. A laboratory with this type of capability is often referred to as a standards or standards calibration laboratory.

Type II: A capability of which the main purpose is the calibration and adjustment of test, measurement and diagnostic equipment for use in product testing, manufacturing, servicing, etc. A laboratory with this type of capability has the appropriate working standards and calibration systems to be able to calibrate to a manufacturer=s specification and tolerance or calibrate to a written standard, using appropriate test uncertainty ratios (TUR). A laboratory with this type of capability usually reports a measurement value and indicates if the test equipment complies with a specification, tolerance or a written standard. It will, usually, base its capabilities on the specifications and tolerances of the working standards being used. It also has, normally, the means to check its working standards between calibrations and has available the appropriate environment(s). A laboratory with this type of capability is often referred to as a test equipment calibration laboratory.

Type III: A calibration capability, within a laboratory, mobile or fixed, with the appropriate reference or working standards, of which the main purpose is to provide a reference. A laboratory with this type of capability usually has minimal means to monitor its calibration system. It relies mainly on the values assigned by higher echelon laboratories to its standards and uses these values with few other considerations to assign values or verify the compliance of equipment being calibrated to their specifications and tolerances or to written standards. This could be an on-site service subject to a wide range of environmental factors.

C. The Abest measurement capability≅ includes the uncertainty associated with the calibration of the accredited laboratory=s reference or transfer standard by NRC, or by a laboratory acceptable to CLAS, uncertainties caused by the transportation of the calibrated reference standard from NRC (or other laboratories) to the accredited laboratory, uncertainties of the calibration process in the accredited laboratory, and uncertainties due to the behaviour of a typical measurement device during its calibration. These uncertainties include components which could have been evaluated by statistical methods on a of series of repeated measurements and which can be characterised by experimental standard deviations. The other components, which can also be characterized by standard deviations, are evaluated from assumed probability distributions based on experience or other information. These have been combined to form an expanded uncertainty $U = ku_c$ with U determined from a combined standard uncertainty u_c and a coverage factor $k = 2$. Since it can be assumed that the probability distribution characterised by the reported result and u_c is approximately normal, the value of a calibrated device can be asserted to lie in the interval represented by the expanded uncertainty U with a level of confidence of approximately 95 percent. The uncertainties quoted do not include the possible effects on the calibrated device of transportation, long term stability or intended use. For clients requiring a confidence level of 99%, the laboratory is able to adjust the uncertainty accordingly.

D. The uncertainty of a specific calibration by an accredited laboratory can be greater than the Abest measurement capability≅ because it will include uncertainties due to the actual condition and behaviour of the customer=s device during its calibration.

E. As a rule, the smaller the uncertainty sought the greater the cost. Users should not demand uncertainties inappropriate to the device being calibrated or its intended use.

F. SCC accreditation and CLAS certification is the formal recognition of specific calibration capabilities. Neither the NRC nor the SCC guarantee the accuracy of individual calibrations by recognized laboratories.

Time Services
Accreditation Services (CLAS)
Requirements for CLAS Certification
CLAS Certification Process
Directory of Accredited Calibration Laboratories
Tools and Templates
CLAS Documents
Application Forms
CLAS Fees
Calibration Services
Certified Reference Materials
GD-MS
Research & Development
Publications
Success Stories
International Relations
Business Opportunities
Courses/Workshops

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Requirements for CLAS Certification

CLAS is a voluntary program available to calibration laboratories seeking accreditation to ISO/IEC 17025. To be eligible for a CLAS certificate, a calibration laboratory must demonstrate that it is capable of doing specific calibrations and measurements with verified uncertainties and traceabilities to the national measurement standards maintained by NRC. It must also have in place the appropriate personnel, measurement standards and equipment, systems, procedures, and environment necessary to achieve the measurement uncertainties that it is claiming. Finally, it must successfully complete the CLAS assessment of compliance to the criteria and requirements of CAN-P-4D (ISO/IEC 17025), General Requirements for the Accreditation of Calibration and Testing Laboratories.

CLAS Implementation Policy for Transition to CAN-P-4E (ISO/IEC 17025:2005)