



Management Contractor for DOE's
Oak Ridge National Laboratory

Calibration Results

Oak Ridge National Laboratory

ORNL Metrology Laboratory
Bellief Valley Rd Bldg. 5510A
Oak Ridge, TN 37831-6366
Phone: 865.574.7349

Unit Under Test Information	Customer Information	Test Information
Manufacturer: SWAGelok Description: SAMPLE CYLINDER Model Number: 316L-50DF4-150 Serial Number: NA Asset / ID Number: A001819 Custodian: LOGUILLO M Work Order Number: MC524467	Mark Loguillo Badge 00915291 Mail Stop 6461 Bldg 8600 Room C-256 Phone 865-235-9000	Overall Result: PASS Performed on: 09/09/2014 Next Cal Due: 09/09/2015 Performed by: U025711 Environment: 23.0°C 43%Rh Condition F/L: FOUNDD-LEFT Procedure used: STANDARD VOLUME DETERMINATION PPC4/HQS Rev 1.0
Asset No. 		Work Order No. 

ORNL Metrology Laboratory (ORNL ML) certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. This Report of Calibration applies only to the item being calibrated, identified above. This report contains data that are not covered by the NVLAP Scope of Accreditation.

This calibration report documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). Calibration data and conformity assessment (Pass/Fail decision) is limited to the performance of the instrument at the time of test. The "Next Cal Due" date is based on manufacturer's recommendations or best calibration practices and with customer agreement (in the case of external ORNL customers); the instrument should not be used past this date without recalibration. This report shall not be reproduced, except in full, unless written permission for an approved abstract is obtained from ORNL ML. Any report containing accredited data shall not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. Calibration reports without authorizing signature(s) are not valid.

For accredited data, measurement uncertainties at the time of test, expressed in base units, are given on the following pages, where applicable. They are calculated in accordance with the methods described in EA-4/02, NIST TN1297, DKD-3, or other applicable documents that comply with the Guide to the Uncertainty in Measurement (GUM), using a coverage factor of $k=2$, corresponding to a confidence level of approximately 95%. Unless otherwise indicated, any conformity determination in this report is based on a Test Uncertainty Ratio (TUR) of 4:1 or greater. Any TUR less than 4:1 will be identified in the test data. It is the responsibility of the instrument custodian, with the assistance of his/her Quality Representative, to determine whether this level of confidence for the determination of conformance is adequate for the intended use of this instrument.

This calibration was performed using measurement standards traceable to the appropriate standard(s), maintained by the National Institute of Standards and Technology (NIST), to accepted intrinsic standards of measurement, or is derived by ratio type self-calibration techniques. The calibration system used to derive accredited data complies with the requirements of NIST Handbook 150, ANSI/NCSL Z540 1-1999 (R2002), ISO/IEC 17025.

Standards Used

<u>Asset #</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
M095802	HEISE HQS-2 PRESSURE MODULE	04/01/2014	04/01/2015
M139869	OAK RIDGE NATIONAL LABORATORY NONE STANDARD VOL/UME	03/05/2014	03/05/2015
M139871	OAK RIDGE NATIONAL LABORATORY NONE STANDARD VOLUME	03/05/2014	03/05/2015
M212994	HEISE ST-2H INDICATOR DIGITAL	09/08/2014	03/08/2015

Test Data

<u>UUT RANGE/ COMMENT</u>	<u>STANDARD READING</u>	<u>STANDARD MODIFIER</u>	<u>UUT READING</u>	<u>UUT TOLERANCE</u>	<u>UUT ERROR</u>	<u>% TOL</u>	<u>MEASUREMENT UNCERTAINTY</u>	<u>ACCRED</u>	<u>TEST RESULTS</u>
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INITIAL INSPECTION

No Calibration Seals found on the UUT.
Instrument was received in good, functional condition.

VOLUME TESTS

STD Volume= 20.03799cc

Header Base (psia)	Header Test (psia)	Header Equal (psia)	Header + STD (cc)	DUT Base (psia)	DUT Test (psia)	DUT Equal (psia)	DUT Volume (cc)
0.296	20.010	6.013	28.222401	0.295	20.003	3.503	145.15885
0.296	20.010	6.013	28.222401	0.295	20.001	3.503	145.14126
0.296	20.012	6.014	28.223251	0.295	20.002	3.503	145.15441

STD Volume= 99.95029cc

Header Base (psia)	Header Test (psia)	Header Equal (psia)	Header + STD (cc)	DUT Base (psia)	DUT Test (psia)	DUT Equal (psia)	DUT Volume (cc)
0.296	20.010	1.791	108.151931	0.296	19.999	8.703	145.31750
0.295	20.011	1.791	108.156971	0.296	19.998	8.703	145.31140
0.295	20.010	1.790	108.151481	0.295	19.998	8.702	145.31689

Calculated Volume= 145.23339cc

Standard Deviation= 0.08990cc
Uncertainty= 0.39% or 0.564cc

Joe Keck (1nk)

Digitally signed by Joe Keck (1nk)
Date: 2014.09.10 14:19:43 -04'00'

Metrology Engineer/Operations Coordinator

***** End of Data *****