



1501 Decker Avenue Suite 118 Stuart, FL 34994 USA
 Tel: 772 286 7710 1-800-713-6647
 Fax: 772 286 8737 E-mail: sales@iclib.com
 Internet: www.iclib.com

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CALIBRATION REPORT FOR HYDROMETER

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THE INSTRUMENT DESCRIBED BELOW WAS EXAMINED AND TESTED IN ICL'S ISO/IEC 17025 ACCREDITED CALIBRATION LABORATORY, USING NIST TRACEABLE REFERENCE STANDARDS, IN ACCORDANCE WITH ICL'S ISO/IEC 17025 CALIBRATION PROCEDURE REFERENCED BELOW. THIS CALIBRATION MEETS THE REQUIREMENTS OF ISO/IEC 17025, ANSI/NCSL Z540-1-1994, (WHICH SUPERCEDED AND REPLACED MIL-STD 45662A), AND THE ISO-9000 AND QS-9000 SERIES OF QUALITY STANDARDS.

CUSTOMER INFORMATION

SAMPLE CUSTOMER
 STREET ADDRESS
 CITY, STATE ZIP

PURCHASE ORDER NUMBER: NOT AVAILABLE

SUBMITTED BY: SAMPLE COMPANY

DATES

DATE REPORT ISSUED: 05-16-2011

INSTRUMENT INFORMATION

HYDROMETER ASTM 4H INSCRIPTION: CHASE

MODEL: 40004H-C RANGE: 29/41 API DIVISIONS: .1 °API

ENGINEERING UNITS: American Petroleum Institute scale for petroleum products

SERIAL NUMBER: XXXX

ACCURACY TOLERANCE (maximum scale error permitted by ASTM E 100): +/- 0.1 API

RESULTS OF PHYSICAL EXAMINATION

THIS INSTRUMENT WAS EXAMINED UNDER A POLARIZED LENS AND STRAINS IN THE GLASS, IF ANY, WERE JUDGED TO BE MINIMAL AND OF NO DETRIMENT TO THE FUNCTION OF THE INSTRUMENT.

THERE WAS NO LOOSE BALLAST OR OTHER MATERIAL OBSERVED WITHIN THE HYDROMETER.

UNLESS OTHERWISE NOTED BELOW, A SCALE SLIPPAGE INDICATOR IS PRESENT AND CORRECTLY POSITIONED WITHIN THIS INSTRUMENT.

IT WAS DETERMINED THAT THIS INSTRUMENT IS IN GOOD WORKING ORDER AND IS THEREFORE SUITABLE FOR CALIBRATION.

CALIBRATION PROCEDURE USED: ICL Procedure 02, which is based upon ASTM E 126

RESULTS OF CALIBRATION

NOTE: The indications of this instrument cannot be adjusted or modified by ordinary means; accordingly, the readings given in the table below should be considered, in effect, to be both 'As Found' and 'As Left' readings.

TEST POINT	READING	CORRECTION	ACCEPT LIMIT* (+ or -)	P/M/F	UNCERTAINTY
30.00°API	30.02°API	-0.02°API	0.094°API	PASS	0.056°API
35.00°API	35.08°API	-0.08°API	0.094°API	PASS	0.057°API
40.00°API	39.96°API	+0.04°API	0.093°API	PASS	0.058°API

*ACCEPT LIMIT(s) The acceptance limit(s) shown above represent a statistical evaluation of the instrument's tolerance relative to the uncertainty of the measurement. If required, the acceptance limit is set to a value smaller than the tolerance. The difference between the tolerance and the acceptance limit is the 'guard band'. The guard band is imposed to reduce the probability of a false acceptance (PFA), or a false failure, to 2% or less.

P/M/F Accordingly, there are three possible calibration outcomes:

1. PASS The calibration result falls within the interval described by the test point + or - (the tolerance MINUS the guard band).
2. MARG** (marginal) The calibration result is 'borderline', or indeterminate; it is therefore statistically and metrologically imprudent to declare that the instrument is definitively either 'in-tolerance' or 'out-of-tolerance'.
3. FAIL The calibration result falls outside the interval described by the test point + or - (the tolerance PLUS the guard band).

The methodology and equations used for determination of guard bands and acceptance limits comply with the requirements of ANSI/NCSL Z540.3

THE TEST POINTS IN THE ABOVE TABLE ARE THOSE REQUIRED BY ASTM E 126-05A (SECTION 7.4.1.8).

THE SCALE READING IS DETERMINED BY THE INTERSECTION OF THE HORIZONTAL PLANE, TANGENT TO THE BOTTOM OF THE MENISCUS, ON THE STEM SCALE. SEE ASTM D 1298 FOR DRAWINGS, DISCUSSION AND INSTRUCTION ON MAKING ACCURATE HYDROMETER READINGS.



THE READINGS OF THIS HYDROMETER WERE MADE UNDER MAGNIFICATION AND RESOLVED TO ONE TENTH OF ONE SCALE DIVISION. THE READINGS (AND CORRECTIONS) PRESENTED ABOVE REPRESENT THE AVERAGE OF (A MINIMUM OF) THREE INDEPENDENT OBSERVATIONS OF THE SUBJECT HYDROMETER AND AT LEAST SIX OBSERVATIONS OF THE REFERENCE HYDROMETER AT EACH TEST POINT.

Our best measurement capabilities for hydrometry may be viewed in detail, by unit and by range, on our A2LA Scope of Accreditation, available at www.icllabs.com. These uncertainties have been calculated utilizing the methods elaborated in NIST Technical Note 1297 and the ANSI-NCSS document Z-540-2 entitled 'Guide to the Expression of Uncertainty in Measurement', commonly referred to as the 'GUM'. A coverage factor of 2 sigma (k=2) has been applied to the standard uncertainty in order to express the expanded uncertainty at (approximately) a 95% confidence level.

THE UNCERTAINTIES PRESENTED ABOVE IN THE 'RESULTS' TABLE ARE LARGER THAN OUR BEST MEASUREMENT CAPABILITIES, AS THE RESOLUTION OF THIS INSTRUMENT, ESTIMATED TO BE 0.01°API, AND OTHER CONTRIBUTIONS HAVE BEEN FACTORED INTO THE CALCULATION.

THE EXPANDED UNCERTAINTIES (K=2) REPORTED HERE DO NOT CONTAIN ESTIMATES FOR (1) ANY EFFECTS THAT MAY BE INTRODUCED BY TRANSPORTATION OF THE INSTRUMENT BETWEEN ICL AND THE USER'S LABORATORY, (2) DRIFT OF THE INSTRUMENT, (3) HYSTERESIS OF THE INSTRUMENT, OR (4) ANY MEASUREMENT UNCERTAINTIES INTRODUCED BY THE USER.

FOR FURTHER DISCUSSION OF ACCURACIES ATTAINABLE WITH HYDROMETERS SEE ASTM E 100, E 126 AND D 1298.

LABORATORY ENVIRONMENTAL CONDITIONS: TEMPERATURE: 23°C +/- 2°C RELATIVE HUMIDITY: BETWEEN 40% AND 65%

ALL TEMPERATURES GIVEN IN THIS REPORT ARE THOSE DEFINED BY THE INTERNATIONAL TEMPERATURE SCALE OF 1990 (ITS-90)

THIS CALIBRATION WAS PERFORMED BY: LAWRENCE NIELAND

THE CALIBRATION PERFORMED AND DOCUMENTED BY THIS CALIBRATION REPORT IS A FULL SCALE CALIBRATION AND NO LIMITATIONS OF USE ARE IMPOSED ON THIS INSTRUMENT.

TRACEABILITY INFORMATION

This calibration is traceable to NIST through an unbroken chain of comparisons. The reference standard is used to calibrate the transfer standard, which in turn is used to calibrate the client's instrument. Each step in the chain is fully documented, and measurement uncertainty at each step has been calculated.

The NIST primary reference hydrometer(s) and transfer standard hydrometers(s) utilized in the performance of this calibration are listed below. Transfer standard hydrometers are calibrated annually against the NIST reference hydrometers.

Test Point	NIST Reference hydrometer(s)	Transfer Standard	MTE#	Manufacturer	Next Due
30.00°API	NIST 117269 & 157890	ASTM 4H 32633	088	Kessler	09/26/11
35.00°API	NIST 117269 & 157890	ASTM 4H 32633	088	Kessler	09/26/11
40.00°API	NIST 117269 & 157890	ASTM 4H 32633	088	Kessler	09/26/11

ICL CALIBRATION LABORATORIES, INC.

An ISO/IEC 17025 & ANSI/NCSS Z-540-1 accredited laboratory - American Association for Laboratory Accreditation Certificate #526.01

J. Jeff Kelly, Technical Director
Deborah M. Weber, Quality Deputy

This document prepared by LORI PARR and reviewed by KAREN MANGOLD

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RECALIBRATION DATE SPECIFIED BY CLIENT: May 16, 2012

NIST GMP-11 (Mar '03), 'Good Measurement Practice for Assignment and Adjustment of Calibration Intervals for Standards' states that, 'Temperature standards are dynamic with use. Shock, contamination and other factors can cause drift from accepted values'. Table 4 of GMP-11 recommends recalibration of liquid-in-glass thermometers, standard thermistors and PRTs at 12 month intervals. Liquid-in-glass thermometers used for 'Temperature Critical Parameters' should be recalibrated at 6 month intervals. NIST GMP-11 is available for download in Adobe .pdf format on our website at www.icllabs.com. Follow the link for 'Downloads'.

The API 'Manual of Petroleum Measurement Standards', Chapter 7, June, 2001, specifies a 12 month recalibration interval for liquid-in-glass thermometers (see section 8.3) and for portable electronic thermometers (PETs). See section 8.2

The user should be aware that any number of factors may cause this instrument to drift out of calibration before the specified calibration interval has expired.

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This calibration report applies only to the item calibrated. This calibration report shall not be used to claim product endorsement by the A2LA.

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