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CERT. 526.01 CALIBRATION

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CALIBRATION REPORT FOR THERMOMETER

Report No. W173259 Page 1 of 2 SO: 123456

The instrument identified herein was examined and calibrated in ICL's calibration laboratory, using NIST traceable standards, following the calibration procedure referenced below. This calibration fulfills the requirements of ISO/IEC 17025-2005, 'General Requirements for the Competence of Testing and Calibration Laboratories' and ANSI/NCSL Z540-1-1994,'Calibration Laboratories and Measuring and Test Equipment - General Requirements'.

CLIENT

SAMPLE CUSTOMER
STREET ADDRESS
CITY, STATE ZIP

Purchase order number: NOT AVAILABLE

Submitted by: SAMPLE COMPANY

DATES

Date report issued: 10-11-2013

UUT (Unit Under Test) INFORMATION

THERMOMETER ASTM 12F Inscription: LSW

Model: 10012F-C Range: -5/215F Divisions: 0.5°F

Engineering units: degrees Fahrenheit Immersion: TOTAL

Serial number: XXXX

Accuracy tolerance (maximum scale error permitted by ASTM): +/- 0.25F

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.

The capillary of this thermometer was examined under 20X magnification. No foreign material, moisture, or other evidence of contamination were discovered, unless noted below. No discernible capillary irregularities were noted.

It was determined that this instrument is in good working order and is therefore suitable for calibration.

CALIBRATION PROCEDURE

ICL Procedure 01, which is based upon ASTM E77, NBS Monograph 150 & NIST SP 250-23

LABORATORY ENVIRONMENTAL CONDITIONS

Temperature: 23°C +/- 2°C Relative humidity: 30 to 70%

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	UUT READING	CORRECTION	TOLERANCE	ACCEPT LIMIT*	P/M/F	UNCERTAINTY
-4.00°F	-4.00°F	0.00°F	0.25°F	0.246°F	PASS	0.12°F
15.00°F	14.95°F	+0.05°F	0.25°F	0.246°F	PASS	0.12°F
32.00°F	31.95°F	+0.05°F	0.25°F	0.246°F	PASS	0.12°F
60.00°F	59.90°F	+0.10°F	0.25°F	0.246°F	PASS	0.12°F
85.00°F	84.85°F	+0.15°F	0.25°F	0.246°F	PASS	0.12°F
110.00°F	109.95°F	+0.05°F	0.25°F	0.246°F	PASS	0.12°F
135.00°F	134.95°F	+0.05°F	0.25°F	0.246°F	PASS	0.12°F
160.00°F	160.00°F	0.00°F	0.25°F	0.246°F	PASS	0.12°F
185.00°F	184.95°F	+0.05°F	0.25°F	0.246°F	PASS	0.12°F
210.00°F	209.90°F	+0.10°F	0.25°F	0.246°F	PASS	0.12°F

**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 at any particular test point:

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 above readings were made under magnification and resolved to one tenth of one scale division.

THE TEST POINTS LISTED IN THE ABOVE TABLE ARE THOSE SPECIFIED IN ASTM E1 (CURRENT REVISION).

Unless otherwise stated, the thermometer was permitted to stabilize for a minimum of 5 minutes at each test temperature prior to reading.

LIMITATIONS OF USE

The calibration performed is a full range calibration and no limitations of use are imposed on this instrument.

MEASUREMENT UNCERTAINTY

The measurement uncertainty reported is the expanded uncertainty at 2 sigma (k = 2), to provide a confidence level of approximately 95%.

The uncertainty is calculated considering Type A contributors including the standard deviation of the measurement process from check standard control charts, the standard deviation of monthly Triple Point of Water calibrations of the standard, and UUT variability observed during the calibration, as well as Type B contributors, which include comparator uniformity, uncertainty of the calibration of the standard, stem conduction and other immersion effects, the sensitivity and accuracy of the standard thermometer's readout, and resolution of the standard and UUT.

The Type A and B contributors are combined using the root-sum-square method to obtain the standard uncertainty at 1 sigma. The standard uncertainty is then multiplied by 2 to obtain the expanded uncertainty at 2 sigma (k = 2).

The expanded uncertainty presented in this report was calculated using methodology consistent with the ISO Guide to the Expression of Uncertainty in Measurement (the 'GUM') and NIST Technical Note 1297.

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 facility, (2) drift of the instrument, (3) hysteresis of the instrument, or (4) any measurement uncertainties introduced by the user.

NOTES AND SUPPLEMENTAL INFORMATION

For a discussion of accuracies attainable with thermometers such as this instrument see NIST Special Publication 250-23, ASTM E1, and ASTM E77.

All temperatures given in this report are those defined by the International Temperature Scale of (ITS-90)

** IMPORTANT NOTE: The readings and corrections noted above apply for the condition of immersion indicated, provided the ice point reading, taken after exposure for not fewer than three days to a temperature of about 23 degrees Celsius (73F), is 31.95°F.

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. Every step in the chain is fully documented, and measurement uncertainty has been calculated at each step.

Our NIST primary reference thermometer from -196 to 420C is a Rosemount model 162CE 25.5 Ohm SPRT, serial no. 5058, calibrated by NIST on August 17, 2012. NIST GMP-11 recommends a 36 month calibration cycle for SPRTs. PRT transfer standards and ASTM liquid-in-glass transfer standards are calibrated annually against this SPRT, per NIST GMP-11 recommendations.

Test Point	Comparator	MTE#	Manufacturer	Transfer Standard	MTE#	Manufacturer	Next Due
-4.00°F	7341 alc bath	238	Hart Scientific	5628-15 PRT 1755	306	Hart Scientific	09/07/14
15.00°F	7341 alc bath	238	Hart Scientific	5628-15 PRT 1755	306	Hart Scientific	09/07/14
32.00°F	7341 alc bath	238	Hart Scientific	5628-15 PRT 1755	306	Hart Scientific	09/07/14
60.00°F	7341 alc bath	238	Hart Scientific	5628-15 PRT 1755	306	Hart Scientific	09/07/14
85.00°F	Water bath	022	PolyScience	5628-15 PRT 1100	290	Hart Scientific	09/07/14
110.00°F	Water bath	022	PolyScience	5628-15 PRT 1100	290	Hart Scientific	09/07/14
135.00°F	Water bath	022	PolyScience	5628-15 PRT 1100	290	Hart Scientific	09/07/14
160.00°F	6331 water bath	242	Hart Scientific	5628-15 PRT 1755	306	Hart Scientific	09/07/14
185.00°F	6331 water bath	242	Hart Scientific	5628-15 PRT 1755	306	Hart Scientific	09/07/14
210.00°F	6022 oil bath	003	Hart Scientific	5628-12 PRT 0523	228	Hart Scientific	09/08/14

TECHNICIAN: J. JEFF KELLY

ICL CALIBRATION LABORATORIES, INC.

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

Approved by: Sample only

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This report document was prepared by LORI PARR

Date report issued: 10-11-2013 Recalibration date specified by client: October 11, 2014

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.