# ICL CALIBRATION LABORATORIES, INC.

**ISO/IEC 17025 and ANSI/NCSL Z540-1 accredited**
The specialists in ASTM and laboratory thermometers & hydrometers
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## CALIBRATION REPORT FOR DIGITAL THERMOMETER

*Report No. Q144400 Page 1 of 2*

*THIS REPORT OF CALIBRATION SHALL DOCUMENT THAT THE INSTRUMENT DESCRIBED HEREIN WAS EXAMINED AND TESTED IN ICL'S ISO/IEC 17025 ACCREDITED CALIBRATION LABORATORY, AGAINST 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 THIS CALIBRATION MEETS THE REQUIREMENTS OF ISO/IEC 17025, ANSI/NCSL Z540-1-1994, (WHICH SUPERCEDED AND REPLACED MIL-STD 45662A), AND THE ISO-9000 AND QS-9000 SERIES OF QUALITY STANDARDS.*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:

*WASHINGTON STATE PATROL*
*811 EAST ROANOKE*
*SEATTLE, WA 98102*

*PURCHASE ORDER NUMBER: NOT AVAILABLE*

*SUBMITTED BY: WASHINGTON STATE PATROL*

### INSTRUMENT INFORMATION:

*DATE RECEIVED FOR CALIBRATION: 01-25-2007 DATE CALIBRATED: 01-30-2007*

*DIGITAL THERMOMETER MODEL NUMBER: 4300*

*SERIAL NUMBER: 091793 INSCRIPTION: GUTH LABS INC.*

*SCALE: Celsius (Centigrade) SCALE RANGE: 29.5/38.5C SCALE DIVISIONS: .01 °C*

*IMMERSION: PROBE*

*ACCURACY TOLERANCE: +/- 0.025C PER MANUFACTURER'S MANUAL*

### RESULTS OF PHYSICAL EXAMINATION:

*THIS INSTRUMENT WAS RECEIVED IN OPERABLE CONDITION, UNLESS OTHERWISE NOTED.*

**CALIBRATION PROCEDURE USED:** *ICL Procedure 04, which is drawn from ASTM E-77, E-220 and E-563*

### RESULTS OF CALIBRATION:

**'AS FOUND'**

| TEST TEMP | AS FOUND | CORRECTION | TOLERANCE | IN TOL? | UNCERTAINTY |
|---|---|---|---|---|---|
| 33.00°C | 33.01°C | -0.01°C | 0.03°C | YES* | 0.016°C |
| 34.00°C | 34.01°C | -0.01°C | 0.03°C | YES* | 0.016°C |
| 35.00°C | 35.01°C | -0.01°C | 0.03°C | YES* | 0.016°C |

*NO ADJUSTMENTS WERE MADE TO THIS INSTRUMENT.*

**'AS LEFT'**

| TEST TEMP | AS LEFT | CORRECTION | TOLERANCE | IN TOL? | UNCERTAINTY |
|---|---|---|---|---|---|
| 33.00°C | 33.01°C | -0.01°C | 0.03°C | YES* | 0.016°C |
| 34.00°C | 34.01°C | -0.01°C | 0.03°C | YES* | 0.016°C |
| 35.00°C | 35.01°C | -0.01°C | 0.03°C | YES* | 0.016°C |

***THIS INSTRUMENT MEETS THE ACCURACY TOLERANCE AT THE POINTS TESTED.***

**DECISION RULE: Unless otherwise instructed, ICL uses the following decision rule: if indications are perceived to reside within the tolerance limits, the indications are considered as 'In-Tolerance'; any indications perceived to reside outside the tolerance limits are considered to be 'Out-of-Tolerance'. The measurement uncertainty is not considered in this declaration.*

*An asterik (*) alongside the 'Yes' or 'No' in the 'IN TOLERANCE?' column in the table of corrections above should alert the user that the amount by which the device is either In-Tolerance or Out-of-Tolerance is smaller than the measurement uncertainty attributable to that calibration result.*

*Our best measurement capabilities are: at Liquid Nitrogen (approximately -196C), +/- 0.0062C; from -80 to 0C, +/- 0.0089C; at 0C, +/- 0.0039C; at 0.01C (TPW), +/- 0.0019C; from 0.01 to 100C, +/- 0.0085C; from 100 to 200C, +/- 0.0094C; from 200 to 300C, +/- 0.0098C; from 300 to 420C, +/- 0.014C; from 420 to 500C, +/- 0.034C; from 500 to 700C, +/- 0.26C; from 700 to 1000C, +/- 0.86C. These uncertainties have been calculated utilizing the methods elaborated in NIST Technical Note 1297 and the ANSI-NCSL document Z-540-2 entitled 'Guide to the Expression of Uncertainty in Measurement'. 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°C, 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.*

*LABORATORY ENVIRONMENTAL CONDITIONS: TEMPERATURE: 23°C +/- 2°C RELATIVE HUMIDITY: BETWEEN 40% AND 60%*

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

*IMPORTANT NOTE: THE CORRECT OPERATION OF DIGITAL ELECTRONIC THERMOMETERS IS DEPENDENT ON ALL COMPONENTS FUNCTIONING PROPERLY. CORRECT TEMPERATURE INDICATION MAY BE IMPEDED BY PHYSICAL DAMAGE TO THE PROBE OR CABLE ASSEMBLY, CONTAMINATION OF ELECTRICAL CONTACTS WITH WATER, OIL, OR OTHER MATERIAL, OR BY LESS OBVIOUS CAUSES SUCH AS LOW BATTERY LEVEL OR FAILURE OF INTERNAL COMPONENTS. ACCORDINGLY, ICL CALIBRATION LABORATORIES, INC. REPRESENTS THAT THE VALUES INDICATED ABOVE WERE THOSE OBSERVED DURING THE PERFORMANCE OF THIS TEST HOWEVER CANNOT BE RESPONSIBLE FOR INACCURATE READINGS WHICH MAY BE EXPERIENCED IN FUTURE USES DUE TO CONDITIONS WHICH ARE BEYOND OUR CONTROL.*

*THIS CALIBRATION WAS PERFORMED BY: DEBORAH M. WEBER*

***THE CALIBRATION PERFORMED AND DOCUMENTED BY THIS REPORT OF TEST IS A LIMITED CALIBRATION AND ACCORDINGLY, LIMITATIONS OF USE ARE IMPOSED AS FOLLOWS:***

***THIS INSTRUMENT CAN BE USED WITH CONFIDENCE ONLY WITHIN THE RANGE BRACKETED BY THE TEST POINTS AND/OR IMMEDIATELY AROUND THE TEST POINTS.***

## *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.*

*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 May 15, 2006. NIST GMP-11 recommends a 36 month calibration cycle for SPRTs. Transfer standards PRTs are calibrated against this reference standard semi-annually; ASTM liquid-in-glass transfer standards are calibrated annually.*

*Our primary reference thermometer for temperatures from 500 to 1000C is a Hart Scientific model 5624 PRT sensor, serial no. 0105, MTE-243, calibrated by Hart Scientific.*

| Test Point | Comparator | MTE# | Manufacturer | Transfer Standard | MTE# | Manufacturer | Next Due |
|---|---|---|---|---|---|---|---|
| 33.00°C | 7310 water bath | 012 | Polyscience | 5614 PRT 576776 | 130 | Hart Scientific | 02/25/07 |
| 34.00°C | 7310 water bath | 012 | Polyscience | 5614 PRT 576776 | 130 | Hart Scientific | 02/25/07 |
| 35.00°C | 7310 water bath | 012 | Polyscience | 5614 PRT 576776 | 130 | Hart Scientific | 02/25/07 |

## *ICL CALIBRATION LABORATORIES, INC.*

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

*J. JEFF KELLY, TECHNICAL DIRECTOR*

Karen Alleborn

*DEBORAH M. WEBER, A.S.C.P. ACCREDITED TECHNOLOGIST This document prepared by LORI PARR and reviewed by KAREN ALLEBORN*

*DATE CALIBRATED: 01-30-2007 RECALIBRATION DATE SPECIFIED BY CLIENT: January 30, 2008*

*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 report applies only to the item calibrated.*