SOUTHWEST RESEARCH INSTITUTE®
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Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-4834

Certificate of Calibration

ACCREDITED
Calibration Laboratory
Certificate #0972-01

Cost Center: DIV20
Mail Stop: B51
Customer: DON BANNON
Manufacturer/Model: ERTCO / ASTM 1C
Description: THERMOMETER, GLASS
Serial Number: 4418
Asset Number: 011677
Procedure: THERMOMETERS - 26 MAR 09

Work Order: 303087949
Date Issued: 4-Jun-2009
Date Calibrated: 3-Jun-2009
*** Date Due :** 3-Jun-2010
**** Results:** FOUND-LEFT
Temperature: 79°F
Humidity: 37 %

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 2005, ANSI/NCSL Z540-1-1994 and relevant requirements of the ISO 9000-2000 standard. This certificate shall not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. This certificate shall not be used to claim product endorsement by Southwest Research Institute, American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government. Results of this calibration relate only to the instrument described above at the time of calibration and does not imply any long term stability of the instrument.

*Determined by the customer, does not imply the instrument will remain within tolerance as any number of factors may cause an out-of-tolerance condition before this date. **Data type found in this certificate or attached measurement report must be interpreted as: Found-left - adjustment and/or repair was not performed, As-found - data is before unit is adjusted and/or repaired, As-left - data is after adjusted and/or repaired was performed. The customer has sole responsibility for determination of in-/out-of-tolerance or compliance/noncompliance.

Measurement uncertainty calculated in accordance with the method described in the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM), for a confidence level of approximately 95 percent using a coverage factor of $k=2$.

Remarks:

Standards Used

Asset #	Manufacturer	Model	Description	Cal Date	Due Date
009137	HART SCIENTIFIC	1575	SUPER THERMOMETER	15-May-2009	15-Nov-2009
013908	HART SCIENTIFIC	5628	SPRT	20-Feb-2008	20-Feb-2010

Walt Hill
Laboratory Manager

Mark Romero
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303087949	Mfr.:	Ertco	Technician:	Mark Romero
Asset No.:	011677	Model:	ASTM 1C	Type Data:	Found-left
Serial No.:	4418	Type:	Thermometer	Cal Date:	3-Jun-09
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/- Limit	+/- Uncertainty	Result	% Limit
Temperature	°C	°C	°C	°C	°C		
	-19.8	-19.5	0.3	0.5	0.06	Pass	60%
	0.1	0.2	0.1			Pass	20%
	50.1	50.5	0.4			Pass	80%
	100.5	100.3	-0.2			Pass	40%
	150.0	150.1	0.1			Pass	20%

END OF REPORT

Explanation of Measurement Report Results

"When statements of compliance (Pass/Fail) are made, the uncertainty of measurement shall be taken into account". Reference ISO/IEC 17025:2005, 5.10.4.2

This explanation is provided to you because the instrument submitted for calibration has one or more of the following results.

Result

Pass – measured value or test is within the ± limit, in tolerance, with a confidence level of 95 percent.

____ Pass? – measured value is *within* the ± limit, but by a margin less than half of the uncertainty interval and has a confidence level of less than 95 percent of being in tolerance. Adjustment is made and the measurement is repeated. If adjustment or repair is not possible or fails to improve the results, then the customer must determine in or out of tolerance.

____ Fail? – measured value is *outside* the ± limit, but by a margin less than half of the uncertainty interval and is reported as out of tolerance but it is not possible to state this with a 95 percent confidence level. Adjustment is made and the measurement is repeated. If adjustment or repair is not possible or fails to improve the results, then the customer must determine if out of tolerance action is necessary.

____ Fail – measured value is *outside* the ± limits with a 95 percent confidence level. Adjustment is made and the measurement is repeated for As-left data. If adjustment or repair is not possible or fails to improve the results, then the customer must determine if the measured value is in compliance for the intended use.

%Limit

__/__ Adjustment is made, if possible, when the As-found measured value is equal to or greater than 70 percent of the ± limit. If adjustment is not possible or did not lower the As-left reading below 70 percent, the customer shall determine if the instrument is suitable for their requirements.

Type Data

Found-left All measurements were in tolerance and no adjustments or repairs were preformed.

As-found One or more measurements were other than Pass or exceeded 70 percent of the ± limit and adjustment or repairs were performed.

As-left Results of measurements after adjustment or repair.

Uncertainty

Best estimate of the dispersion of the measured value that could be contributed by the; standard, environment, repeatability of the measurement process, characterizes of the instrument being calibrated (i.e. resolution) etc.

Please call extension 5215 for questions or additional information.