



SOUTHWEST RESEARCH INSTITUTE™

6220 Culebra Road, P.O. Drawer 28510
Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: ERTCO ASTM 1C

Description: THERMOMETER

Serial No: E98-191

Asset No: 007665

Procedure: TEMPERATURE, MAY/03

Work Order: 444053950

Date Issued: Jun 4, 2003

Calibration Date: Jun 3, 2003

****Calibration Due:** Dec 3, 2003

Calibration Location: Bldg. 64

Environment: Temp. 74.0°F Hum. 49 %RH

***As Found:** IN TOLERANCE

***As Left:** IN TOLERANCE

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, 1999 and ANSI/NCCL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of $k=2$ to approximate a 95% confidence level. The calibration process provides a Test Uncertainty Ratio (TUR) of less than or equal to 25% (4:1) of the test limit unless otherwise stated in remarks or an attachment.

*The client has sole responsibility for determination of in/out of tolerance or compliance/noncompliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.

**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009917	HART SCIENTIFIC, INC	5612	RTD	Jul 06, 04
009414	HART SCIENTIFIC, INC	1502A	TEMPERATURE READOUT	Jul 06, 03

Approved by: Walt Hill

Metrology Group Leader

m:\Non2\la1.rpt Rev date 15, August 02

Measurements by: Mark Romero

Metrology Technician

Southwest Research Institute
Calibration laboratory
Caibration Report

Work Order:	444053950	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007665	Model	ASTM 1C		
Serial No.	E98-191	Type.	THERMOMETER	Cal Date.	03-Jun-03
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Results
	-19.9	-20.0	-0.1	0.5	0.6	Pass
	0.1	0.0	-0.1	0.5	0.6	Pass
	49.9	50.3	0.4	0.5	0.6	Pass
	99.9	100.4	0.5	0.5	0.6	Pass
	149.9	150.2	0.3	0.5	0.6	Pass

END OF REPORT



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Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: ERTCO ASTM 1C

Description: THERMOMETER

Serial No: E98-191

Asset No: 007665

Procedure: CL-9, 5/99

Work Order: 444051360

Date Issued: Dec 17, 2002

Calibration Date: Dec 16, 2002

****Calibration Due:** Jun 16, 2003

Calibration Location: N/A

Environment: Temp. 79.0°F Hum. 45 %RH

***As Found:** IN TOLERANCE

***As Left:** IN TOLERANCE

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Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Dec 31, 02
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Dec 31, 02

Approved by: Walt Hill

Metrology Group Leader

m:\Nona21a1.rpt Rev date 15, August 02

Measurements by: Vince Morales

Metrology Technician

Work Order:	444051360	Mfr.	ERTCO	Technician	Vmorales
Asset No.	7665	Model	ASTM 1C	Procedure	CL-9 5/99
Serial No.	E98-191	Type.	THERMOMETER	Cal Date.	16-Dec-02
Remarks:					

Function/Range	Test Point	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Results
-20	-19.9	-19.9	0.0	0.5	1.2	Pass
0	0.1	0.5	0.4	0.5	1.2	Pass
50	49.9	50.3	0.4	0.5	1.2	Pass
100	99.9	100.4	0.5	0.5	1.2	Pass
150	150.1	150.0	-0.1	0.5	1.2	Pass



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Institute Calibration Laboratory
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Certificate #
0972-01

Certificate of Calibration

Submitted By: DIV20
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ERTCO ASTM 1C
Description: THERMOMETER
Serial No: E98-191
Asset No: 007665
Procedure: TEMPERATURE, MAY/03

Work Order: 444056725
Date Issued: Dec 23, 2003
Calibration Date: Dec 22, 2003
****Calibration Due:** Jun 22, 2004
Calibration Location: Bldg. 64
Environment: Temp. 76.0°F Hum. 27 %RH
***As Found:** IN TOLERANCE
***As Left:** IN TOLERANCE

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**Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Feb 05, 04
008920	HART SCIENTIFIC, INC	5614-17660-A-12	PLATINUM RTD	Feb 07, 04

Approved by: Walt Hill
Metrology Group Leader
m:\a21a1.rpt Rev date 15, August 02

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
 Calibration laboratory
 Calibration Report

Work Order:	444056725	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007665	Model	ASTM 1C		
Serial No.	E98-191	Type.	THERMOMETER	Cal Date.	22-Dec-03
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Result
	-19.9	-19.8	0.1	0.5	0.6	Pass
	0.1	0.3	0.2	0.5	0.6	Pass
	50.0	50.3	0.3	0.5	0.6	Pass
	99.9	100.1	0.2	0.5	0.6	Pass
	149.9	150.2	0.3	0.5	0.6	Pass
END OF REPORT						



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Institute Calibration Laboratory
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Certificate #
0972-01

Certificate of Calibration

Submitted By: DIV20
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ERTCO ASTM 1C
Description: THERMOMETER
Serial No: E98-191
Asset No: 007665
Procedure: TEMPERATURE, JAN/04

Work Order: 444059294
Date Issued: Jun 10, 2004
Calibration Date: Jun 9, 2004
****Calibration Due:** Dec 9, 2004
Calibration Location: Bldg. 64
Environment: Temp. 75.0°F Hum. 52 %RH
***As Found:** IN TOLERANCE
***As Left:** IN TOLERANCE

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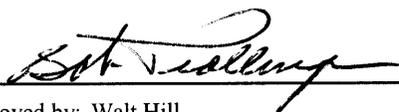
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Remarks: None

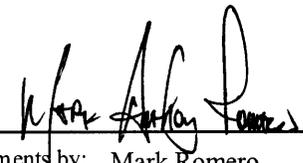
Standards Used

Asset	Manufacturer	Model	Description	Cal Due
008920	HART SCIENTIFIC	5614-17660-A-12	PLATINUM RTD	Sep 09, 04
009137	HART SCIENTIFIC	1575	THERMOMETER	Sep 05, 04



Approved by: Walt Hill

Metrology Group Leader
m:\a21a1.rpt Rev date 11, May 04



Measurements by: Mark Romero

Metrology Technician

Southwest Research Institute
Calibration Laboratory
Caibration Report

Work Order:	444059294	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007665	Model	15-166A		
Serial No.	E98-191	Type.	THERMOMETER	Cal Date.	09-Jun-04
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Result
-20	-19.8	-19.9	-0.1	0.5	0.58	Pass
0	0.1	0.0	-0.1	0.5	0.58	Pass
50	50.0	50.2	0.2	0.5	0.58	Pass
100	100.0	100.5	0.5	0.5	0.58	Pass
150	150.1	150.0	-0.1	0.5	0.58	Pass
END OF REPORT						



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Certificate of Calibration

0972-01

Submitted By: DIV20
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ERTCO ASTM 1C
Description: THERMOMETER
Serial No: E98-191
Asset No: 007665
Procedure: TEMPERATURE, JAN/04

Work Order: 444062203
Date Issued: Jan 7, 2005
Calibration Date: Jan 7, 2005
****Calibration Due:** Jul 7, 2005
Calibration Location: Bldg. 64
Environment: Temp. 73.0°F Hum. 40 %RH
***As Found:** IN TOLERANCE
***As Left:** IN TOLERANCE

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Remarks: None

Standards Used

Asset	Manufacturer	Model	Description	Cal Due
009414	HART SCIENTIFIC	1502A	TEMPERATURE READOUT	Mar 30, 05
010692	HART SCIENTIFIC	5618	PLATINUM RTD	Feb 16, 05

Approved by: Walt Hill
Metrology Group Leader
m:\a2\al.rpt Rev date 11, May 04

Measurements by: Bob Trollinger
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	444062203	Mfr.	Ertco	Technician	blt
Asset No.	007665	Model	ASTM 1C ASTM 1C		
Serial No.	E98-191	Type.	THERMOMETER	Cal Date.	07-Jan-05
Remarks:	Accuracy Reference ANSI Z236.1-1983				

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	°C	°C	°C	°C	°C	Result
	-18.8	-18.8	0.0	0.5	0.12	Pass
	0.1	0.5	0.4	0.5	0.12	Pass
	50.0	50.5	0.5	0.5	0.12	Pass
	99.9	100.2	0.3	0.5	0.12	Pass
	150.0	150.0	0.0	0.5	0.12	Pass

END OF REPORT