



Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78238
(210) 522-5215
Department of Quality Assurance
Calibration Laboratory



Certificate #
0972-01

Certificate of Calibration

6 May 1999

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: ERTCO 76MM 1MM
Description: THERMOMETER
Serial Number: E98-273
Asset Number: 007303

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results of this calibration certificate were determined in accordance with the terms of accreditation unless stated otherwise below.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

Ambient Conditions: Temperature: 75.0 Degrees Fahrenheit Humidity: 57 % RH

Calibration Date: 5 May 99

Calibration Procedure: TO33K5-4-42-1 APR97

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

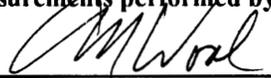


Jim Patterson, Supervisor or Walt Hill, Metrologist

Certificate # 34365

m:\a2la.rpt Rev date 10 Mar 99

Measurements performed by:



Mack Wood, Technician

Page 1 of 1



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 76MM 1MM

Description: THERMOMETER

Serial No: E98-273

Asset No: 007303

Procedure: CL-9, 5/99

Work Order: 444050128

Date Issued: Sep 17, 2002

Calibration Date: Sep 17, 2002

****Calibration Due:** Mar 17, 2003

Calibration Location: N/A

Environment: Temp. 74.0°F Hum. 50 %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/NCSL 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
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Dec 10, 02
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Dec 07, 02

Approved by: Walt Hill
Metrology Group Leader

Measurements by: Walt Hill
Metrology Technician

Southwest Research Institute
 Calibration laboratory
 Calibration Sheet.

Work Order:	444050128	Mfr.	FISHER SCIENTIFIC	Technician	WHILL
Asset No.	007303	Model	76MM 1MM	Procedure	CL-9 5/99
Serial No.	E98-273	Type.	THERMOMETER	Cal Date.	September 17, 2002
Remarks:					

Function/Range	Standard	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
	Deg c	Deg c	Deg c	Deg c	Deg c	Results
-20	-19.79	-20.1	-0.3	1	1.2	Pass
0	0.10	0.2	0.1	1	1.2	Pass
50	49.99	50.0	0.0	1	1.2	Pass
100	99.94	99.9	0.0	1	1.2	Pass
150	149.81	149.5	-0.3	1	1.2	Pass



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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: E98-273

Asset No: 007303

Procedure: THERMOMETERS, JAN/03

Work Order: 444053020

Date Issued: Mar 27, 2003

Calibration Date: Mar 27, 2003

****Calibration Due:** Sep 27, 2003

Calibration Location: Bldg. 64

Environment: Temp. 80.0°F Hum. 36 %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	Jul 06, 03
008920	HART SCIENTIFIC, INC	17660-A-120-6-W	PLATINUM RTD	Jul 06, 03

Approved by: Walt Hill
Metrology Group Leader
m:\Nona2\al.rpt Rev date 15, August 02

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
Calibration laboratory
Measurement Record

Work Order:	444053020	Mfr.	Ertco	Technician	Mark A. Romero
Asset No.	007303	Model	ASTM 1C	Cal Date.	27-Mar-03
Serial No.	E98-273	Type.	THERMOMETER		
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	-20.0	-20.0	0.0	0.5	1.2	Pass
0	0.1	0.0	-0.1	0.5	1.2	Pass
50	50.0	49.9	-0.1	0.5	1.2	Pass
100	100.0	99.8	-0.2	0.5	1.2	Pass
150	150.0	149.9	-0.1	0.5	1.2	Pass
END OF REPORT						



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



Certificate of Calibration

0972-01

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: ERTCO ASTM 1C

Description: THERMOMETER

Serial No: E98-273

Asset No: 007303

Procedure: TEMPERATURE, MAY/03

Work Order: 444056722

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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Remarks: None

Standards Used

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

Approved by: Walt Hill
Metrology Group Leader
m:\a2la1.rpt Rev date 15, August 02

Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
 Calibration laboratory
 Calibration Report

Work Order:	444056722	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007303	Model	ASTM 1C		
Serial No.	E98-273	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	-20.2	-0.3	0.5	0.6	Pass
	0.1	0.0	-0.1	0.5	0.6	Pass
	50.0	50.0	0.0	0.5	0.6	Pass
	99.9	100.0	0.1	0.5	0.6	Pass
	149.9	150.0	0.1	0.5	0.6	Pass
END OF REPORT						



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Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692



Certificate #

0972-01

Certificate of Calibration

Submitted By: DIV20

Address: B57

Contact: DARRELL DUNN

Manufacturer Model: ERTCO ASTM 1C

Description: THERMOMETER

Serial No: E98-273

Asset No: 007303

Procedure: TEMPERATURE, JAN/04

Work Order: 444059292

Date Issued: Jun 10, 2004

Calibration Date: Jun 10, 2004

****Calibration Due:** Dec 10, 2004

Calibration Location: Bldg. 64

Environment: Temp. 74.0°F Hum. 52 %RH

***As Found:** IN TOLERANCE

***As Left:** IN TOLERANCE

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Remarks: None

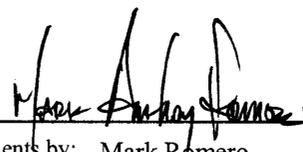
Standards Used

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:\a2la1.rpt Rev date 11, May 04



Measurements by: Mark Romero
Metrology Technician

Southwest Research Institute
 Calibration Laboratory
 Calibration Report

Work Order:	444059292	Mfr.	Fisher Scientific	Technician	Mark Romero
Asset No.	007303	Model	ASTM 1C		
Serial No.	E98-273	Type.	THERMOMETER	Cal Date.	10-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	-20.2	-0.4	0.5	0.58	Pass
0	0.1	0.0	-0.1	0.5	0.58	Pass
50	50.0	50.0	0.0	0.5	0.58	Pass
100	100.1	99.8	-0.3	0.5	0.58	Pass
150	150.0	149.9	-0.1	0.5	0.58	Pass

END OF REPORT



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Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-3692



Certificate of Calibration

0972-01

Submitted By: DIV20
Address: B57
Contact: DARRELL DUNN
Manufacturer Model: ERTCO ASTM 1C
Description: THERMOMETER
Serial No: E98-273
Asset No: 007303
Procedure: TEMPERATURE, JAN/04

Work Order: 444062196
Date Issued: Jan 10, 2005
Calibration Date: Jan 10, 2005
****Calibration Due:** Jul 10, 2005
Calibration Location: Bldg. 64
Environment: Temp. 73.0°F Hum. 40 %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/NCSL 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

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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:\a2la1.rpt Rev date 11, May 04

Measurements by: Bob Trollinger
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	444062196	Mfr.	Ertco	Technician	blt
Asset No.	007303	Model	ASTM 1C		
Serial No.	E98-273	Type.	THERMOMETER	Cal Date.	10-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
	-18.89	-19.0	-0.1	0.5	0.12	Pass
	0.11	0.0	-0.1	0.5	0.12	Pass
	49.98	50.0	0.0	0.5	0.12	Pass
	99.94	100.0	0.1	0.5	0.12	Pass
	150.07	150.0	-0.1	0.5	0.12	Pass

END OF REPORT