



# 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:** BRADLEY WERLING

**Manufacturer Model:** ERTCO ASTM 91 C

**Description:** THERMOMETER

**Serial No:** 1709

**Asset No:** 007617

**Procedure:** CL-9, 5/99

**Work Order:** 444050357

**Date Issued:** Sep 24, 2002

**Calibration Date:** Sep 24, 2002

**\*\*Calibration Due:** Mar 24, 2003

**Calibration Location:** N/A

**Environment:** Temp. 72.0°F Hum. 40 %RH

**\*As Found:** SEE ATTACHED DATA

**\*As Left:** SEE ATTACHED DATA

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/NC SL 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

  
\_\_\_\_\_  
Approved by: Walt Hill

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

  
\_\_\_\_\_  
Measurements by: Bob Trollinger

Metrology Technician

Southwest Research Institute  
 Calibration laboratory  
 Calibration Sheet.

Work Order: 444050357	Mfr. ERTCO	Technician BLT
Asset No. 007617	Model ASTM91C	Procedure CL-9 5/99
Serial No. 1709	Type. THERMOMETER	Cal Date. 24-Sep-02

Remarks:  
 Readings are provided without regard to "Pass" or "Fail". It is up to the user to determine if the readings meet their requirements.

Function/Range	Standard	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
	Deg F	Deg F	Deg F	Deg F	Deg F	
20	20.05	20.1	0.05	0.10	0.30	
30	30.03	30.00	-0.03	0.10	0.30	
40	40.03	40.1	-0.07	0.10	0.30	
50	49.00	49.10	0.10	0.10	0.30	
150	150.00	150.0	0.00	0.10	1.20	



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## Certificate of Calibration

**Submitted By:** DIV20

**Address:** B57

**Contact:** BRADLEY WERLING

**Manufacturer Model:** ERTCO ASTM 91 C

**Description:** THERMOMETER

**Serial No:** 1709

**Asset No:** 007617

**Procedure:** THERMOMETERS, JAN/03

**Work Order:** 444052763

**Date Issued:** Mar 10, 2003

**Calibration Date:** Mar 10, 2003

**\*\*Calibration Due:** Sep 10, 2003

**Calibration Location:** Bldg. 64

**Environment:** Temp. 77.0°F Hum. 41 %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	17660-A-120-6-W	PLATINUM RTD	Jul 06, 03
009137	HART SCIENTIFIC, INC	1575	THERMOMETER	Jul 06, 03

Approved by: Walt Hill

Metrology Group Leader

m:\Non21a1.rpt Rev date 15, August 02

Measurements by: Mark Romero

Metrology Technician

Southwest Research Institute  
Calibration laboratory  
Measurement Record

Work Order:	444052764	Mfr.	Ertco	Technician	Mark Anthony Romero
Asset No.	007618	Model	ASTM 91C		
Serial No.	1709	Type.	THERMOMETER	Cal Date.	10-Mar-03
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	20.05	20.14	0.09	0.10	0.12	Pass
30	30.10	30.09	-0.01	0.10	0.12	Pass
40	40.08	40.10	0.02	0.10	0.12	Pass
50	49.99	50.08	0.09	0.10	0.12	Pass
END OF REPORT						



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## Certificate of Calibration

**Submitted By:** DIV20  
**Address:** B57  
**Contact:** BRADLEY WERLING  
**Manufacturer Model:** ERTCO ASTM 91 C  
**Description:** THERMOMETER  
**Serial No:** 1709  
**Asset No:** 007617  
**Procedure:** TEMPERATURE, MAY/03

**Work Order:** 444055226  
**Date Issued:** Sep 8, 2003  
**Calibration Date:** Sep 5, 2003  
**\*\*Calibration Due:** Mar 5, 2004  
**Calibration Location:** Bldg. 64  
**Environment:** Temp. 75.0°F Hum. 48 %RH  
**\*As Found:** IN TOLERANCE  
**\*As Left:** IN TOLERANCE

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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.

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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	17660-A-120-6-W	PLATINUM RTD	Feb 07, 04

Approved by: Walt Hill  
Metrology Group Leader  
m:\Nona2\1a1.rpt Rev date 15, August 02

Measurements by: Mark Romero  
Metrology Technician

Southwest Research Institute  
 Calibration laboratory  
 Calibration Report

Work Order:	444055226	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007617	Model	ASTM 91C	Cal Date.	05-Sep-03
Serial No.	1709	Type.	THERMOMETER		
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Result
	20.06	20.10	0.04	0.10	0.12	Pass
	30.04	30.07	0.03	0.10	0.12	Pass
	40.03	40.05	0.02	0.10	0.12	Pass
	50.00	50.05	0.05	0.10	0.12	Pass
END OF REPORT						



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Certificate #

0972-01

## Certificate of Calibration

**Submitted By:** DIV20

**Address:** B57

**Contact:** BRADLEY WERLING

**Manufacturer Model:** ERTCO ASTM 91 C

**Description:** THERMOMETER

**Serial No:** 1709

**Asset No:** 007617

**Procedure:** TEMPERATURE, MAY/03

**Work Order:** 444057661

**Date Issued:** Feb 24, 2004

**Calibration Date:** Feb 23, 2004

**\*\*Calibration Due:** Aug 23, 2004

**Calibration Location:** Bldg. 64

**Environment:** Temp. 76.0°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	Mar 05, 04
008920	HART SCIENTIFIC, INC	5614-17660-A-12	PLATINUM RTD	Mar 07, 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:	444057661	Mfr.	Ertco	Technician	Mark Romero
Asset No.	007617	Model	ASTM 91C		
Serial No.	1709	Type.	THERMOMETER	Cal Date.	23-Feb-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
	20.06	20.10	0.04	0.10	0.06	Pass
	30.01	29.98	-0.03	0.10	0.06	Pass
	40.02	39.97	-0.05	0.10	0.06	Pass
	49.99	50.09	0.10	0.10	0.06	Pass
END OF REPORT						



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Certificate #

0972-01

## Certificate of Calibration

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**Address:** B57  
**Contact:** BRADLEY WERLING  
**Manufacturer Model:** ERTCO ASTM 91 C  
**Description:** THERMOMETER  
**Serial No:** 1709  
**Asset No:** 007617  
**Procedure:** TEMPERATURE, JAN/04

**Work Order:** 444060273  
**Date Issued:** Aug 6, 2004  
**Calibration Date:** Aug 6, 2004  
**\*\*Calibration Due:** Aug 6, 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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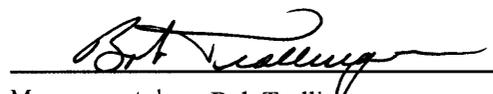
**Remarks:** None

### Standards Used

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



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  
 Calibration Report

Work Order:	444060273	Mfr.	Ertco	Technician	blt
Asset No.	007617	Model	ASTM 91 C		
Serial No.	1709	Type.	THERMOMETER	Cal Date.	06-Aug-04
Remarks:	Accuracy Referecnce ANSI Z236.1-1983				

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Temperature	Deg C	Deg C	Deg C	Deg C	Deg C	Result
20	20.10	20.15	0.05	0.10	0.059	Pass
30	30.03	30.05	0.02	0.10	0.059	Pass
40	40.03	40.00	-0.03	0.10	0.059	Pass
50	49.00	49.10	0.10	0.10	0.059	Pass
END OF REPORT						