

Intertek Testing Services NA Inc.

Middleton, Wisconsin

Calibration Date: 2/28/2011

Next calibration due: 8/28/2011

Calibrated by: js

USING: #008 Platform scale and procedures located:

USE PROCEDURE: MID-OE-LAB-027

Calibration Date of Asset #008

DESCRIPTION:

Audit weights

Model: Rice Lake

SERIAL #: n/a

WHI#: 160

Weight designation	Scale reading	Deviation
A 5.00	4.99	-0.01
B 10.00	10.00	0.00
C 10.00	10.00	0.00
D 20.00	20.00	0.00
E 25.00	25.00	0.00
F 25.00	25.00	0.00

Average Deviation: -0.0016667
Standard Deviation: 0.004082483

Scale accuracy 0.01
Total Uncertainty: 0.01

Reviewed by

Date:

Measurement Uncertainty is calculated using the following formula:

$$O.M.U. = k \cdot \sqrt{(A.D.)^2 + (S.D.)^2 + (R.M.U./2)^2}$$

O.M.U. = Overall Measurement Uncertainty

A.D. = Average Deviation of the difference of all measured results compared to the reference value.

S.D. = Standard Deviation of the difference of all measured results compared to the reference value.

k = Confidence Factor (2 for 95% confidence)

R.M.U. = Standard Measurement Uncertainty of Reference Measurement Equipment. R.M.U. is considered as the measurement uncertainty as stated on calibration certificates of equipment, or the tolerance listed in the calibration standard of the test equipment.

Intertek Testing Services NA Inc.

Middleton, Wisconsin

Calibration Date: 1.19/11

Next Calibration Due: 6/19/2011

Page 1 of 2

Calibrated By: JS

Reviewed By: BL

Date: 1/19/11

This sheet and the MU of Y sheet must be printed and handed in to the calibration administrator. See tabs below.

Use Procedures: MID-OE-LAB-005

Barometer: 29.06

Meter Number 3 Inventory Number: 14

Run Number	Meter Initial	Barometric Pressure	Spirometer Temperature	Vapor Pressure of H ₂ O (Hg)	Meter Temperature	Meter Pressure	Measurement Inches	Spirometer Volume	Meter Final	Y
1	458.174	29.06	70.0	0.7195	70.2	1.2	22.8750	1.0398	459.172	1.0419
2	462.072	29.06	69.5	0.7145	70.2	1.2	22.7500	1.0341	463.075	1.0068
3	463.076	29.06	68.6	0.7195	70.0	1.2	21.7500	0.9886	464.990	1.0283
4	464.990	29.06	68.6	0.7145	70.0	1.2	23.9380	1.0881	465.995	1.0589
5	465.995	29.06	69.5	0.7195	70.2	1.2	23.9380	1.0881	466.998	1.0594
6	467.064	29.06	69.3	0.7145	70.0	1.2	23.6250	1.0739	468.059	1.0541
								1.0521	AVERAGE	1.0416
								0.0389	STDEV.	0.0207709
									MU of Y	0.0415563

Meter Number 1 Inventory Number: 13

Run Number	Meter Initial	Barometric Pressure	Spirometer Temperature	Vapor Pressure of H ₂ O (Hg)	Meter Temperature	Meter Pressure	Measurement Inches	Spirometer Volume	Meter Final	Y
1	953.310	29.06	70.0	0.7320	70.1	1.2	23.438	1.0654	954.315	1.0335
2	951.305	29.06	68.6	0.6978	69.9	1.2	23.688	1.0767	952.315	1.0430
3	952.315	29.06	68.6	0.6978	69.8	1.2	23.2500	1.0568	953.310	1.0390
								1.0663	AVERAGE	1.0385
								0.0100	STDEV.	0.0047802
									MU of Y	0.0096234

Meter Number 2 Inventory Number: 12

Run Number	Meter Initial	Barometric Pressure	Spirometer Temperature	Vapor Pressure of H ₂ O (Hg)	Meter Temperature	Meter Pressure	Measurement Inches	Spirometer Volume	Meter Final	Y
1	995.577	29.06	68.3	0.6909	69.5	1.2	22.313	1.0142	996.572	0.9973
2	996.572	29.06	68.5	0.6955	69.0	1.2	22.625	1.0284	997.571	1.0058
3	998.577	29.06	68.8	0.7024	69.2	1.2	22.4380	1.0199	999.575	0.9980
								1.0208	AVERAGE	1.0004
								0.0071	STDEV.	0.0047
									MU of Y	0.00941
									MU of Y	0.0188521

Accuracy of reading measurement : +/- 1/32 inches
Accuracy of reading measurement : +/- 1/32 inches
Accuracy of reading meter dial: +/- .0001 cu/ft.

0.739

Measurement Uncertainty is calculated using the following formula:

$$O.M.U. = k \cdot \sqrt{(A.D.)^2 + (S.D.)^2 + (R.M.U.)^2}$$

O.M.U. = Overall Measurement Uncertainty

A.D. = Average Deviation of the difference of all measured results compared to the reference value.

S.D. = Standard Deviation of the difference of all measured results compared to the reference value.

k = Confidence Factor (2 for 95% confidence)

R.M.U. = Standard Measurement Uncertainty of Reference Measurement Equipment. R.M.U. is considered as the measurement uncertainty as stated on calibration certificates of equipment, or the tolerance listed in the calibration standard of the test equipment.

G:\MID_Depts\Calibrations\Procedures and Verifications\MID-OE-LAB-005 E&E Dry Gas Meters (I)

Intertek Testing Services NA Inc.

Middleton, Wisconsin

Calibration Date: 11/22/10

Next Calibration Due: 5/22/11

Calibrated by: JS

USING: Fluke Multimeter #109

Use Procedure: MID-OE-LAB-004

DESCRIPTION: Delmhorst calibration block

Model: MSC-1

SERIAL #: 101200

WHI#: 049

Block 1				
Calibration Block Possitic	Desired Reading	Meter Reading	Reading Deviation	
12%	8.33	8.38	0.05	Measurement
12%	8.33	8.43	0.10	Uncertainty Block 1
12%	8.33	8.46	0.13	0.122787125
12%	8.33	8.48	0.15	
22%	1.1	1.102	0.00	
22%	1.1	1.103	0.00	
22%	1.1	1.1	0.00	
22%	1.1	1.1	0.00	
Average Deviation:			0.05	
Standard Deviation:			0.06	

Block 2				
Calibration Block Possitic	Desired Reading	Meter Reading	Reading Deviation	
12%	8.33	8.37	0.04	Measurement
12%	8.33	8.42	0.09	Uncertainty Block 2
12%	8.33	8.4	0.07	0.098703429
12%	8.33	8.44	0.11	
22%	1.1	1.109	0.01	
22%	1.1	1.11	0.01	
22%	1.1	1.109	0.01	
22%	1.1	1.11	0.01	
Average Deviation:			0.04	
Standard Deviation:			0.04	

Acceptable ran: 7.50 - 9.16 nS for 12% side

Acceptable ran: 0.99 - 1.21 MΩ for 22% side

Fluke meter at 0.1

Reviewed By: [Signature] Date: 11/22/10

Measurement Uncertainty is calculated using the following formula:

$$O.M.U. = k \cdot \sqrt{((A.D.)^2 + (S.D.)^2 + (R.M.U./2)^2)}$$

O.M.U. = Overall Measurement Uncertainty

A.D. = Average Deviation of the difference of all measured results compared to the reference value.

S.D. = Standard Deviation of the difference of all measured results compared to the reference value.

k = Confidence Factor (2 for 95% confidence)

R.M.U. = Standard Measurement Uncertainty of Reference Measurement Equipment. R.M.U. is considered as the measurement uncertainty as stated on calibration certificates of equipment, or the tolerance listed in the calibration standard of the test equipment.

SERVICE CALIBRATION RECORD

Service Inspection Agreement

UNITED SCALE and ENGINEERING CORP.

1919 Jonathan Dr., Bedleon, VA 23713

Office: Madison Job No: BD2 M9
Customer No or Name: Intertek

Standards Used: NIST-WS2, C2130

Technician Initials: GW

Date: 3-25-11

Mfg: Toledo
Model No: 8572
Serial No: C8015
Description: counting Scale
Capacity: 100 lb. x .02
Location: NA
Scale ID: NA

Parameter Tested:	Actual As Found:	Deviation:	Final Reading:
1 lb.			1.00
10 lb.			10.00
25 lb.			25.00
50 lb.			50.00
75 lb.			75.00
100 lb.			100.00

Verbal Setup
GW 3-25-11

Uncertainty Measurement: .023 lb

Mfg:
Model No:
Serial No:
Description:
Capacity:
Location:
Scale ID:

Parameter Tested:	Actual As Found:	Deviation:	Final Reading:
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NA

Uncertainty Measurement:

Mfg:
Model No:
Serial No:
Description:
Capacity:
Location:
Scale ID:

Parameter Tested:	Actual As Found:	Deviation:	Final Reading:
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NA

Uncertainty Measurement:

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Intertek Testing Services NA Inc.

Middleton, Wisconsin

Calibration Date: 3/28/11

Next Calibration Due: 8/28/11

Calibrated by: KS

USING: Omega - Model CL6503 Calibrator #174 S/N 132105

USE PROCEDURE: MID-OE-LAB-023

DESCRIPTION: Personal Daq View XL v1.1/Personal Daq view Plus v2.0.10
with Omega (Data acquisition system)

Model: OMB-DAQ-56

SERIAL:

All measurements are in ° F

Calibrator	Computer	Deviation	Calibrator	Computer	Deviation
50	47.3	2.70			-
100	96.8	3.20			-
150	147.2	2.80			-
200	196.9	3.10			-
250	247.6	2.40			-
300	297.5	2.50			-
350	347.9	2.10			-
400	398.1	1.90			-
450	448.7	1.30			-
189	187.7	1.30			-
126	124.9	1.10			-
189	188.0	1.00			-
500	499.1	0.90			-
Average Deviation:					2.02
Standard Deviation:					1.1799

Uncertainty of readings of #174 at 95% CL:

Total Uncertainty:

1.8
5.02

Reviewed by [Signature] Date: 4/25/11

Measurement Uncertainty is calculated using the following formula:

$$O.M.U. = k \cdot \sqrt{(A.D.)^2 + (S.D.)^2 + (R.M.U./2)^2}$$

O.M.U. = Overall Measurement Uncertainty

A.D. = Average Deviation of the difference of all measured results compared to the reference value.

S.D. = Standard Deviation of the difference of all measured results compared to the reference value.

k = Confidence Factor (2 for 95% confidence)

R.M.U. = Standard Measurement Uncertainty of Reference Measurement Equipment. R.M.U. is considered as the measurement uncertainty as stated on calibration certificates of equipment, or the tolerance listed in the calibration standard of the test equipment.

MASS FLOW CALIBRATION DATA SHEET

CUSTOMER:	
PURCHASE ORDER NUMBER:	39572
SERIAL NUMBER:	258646-1
MODEL NUMBER:	FMA1720
GAS:	Nitrogen
FLOW RANGE:	0-10 L/min
CALIBRATION PRESSURE:	14.7PSIA
CALIBRATION TEMPERATURE:	70F(21.1C)
VOLTAGE INPUT:	12V
UNCERTAINTY (ACCURACY):	±1.5%FS


CALIBRATION DATA

PERCENT F.S RANGE (% F.S.)	LINEAR OUTPUT		NOMINAL FLOW (L/min)	ACTUAL FLOW (L/min)	DEVIATION (% F.S)
	(VDC)	(mA)			
0.0	0.00	4.00	0.00	0.00	0.0
25.0	1.25	8.00	2.50	2.55	0.5
50.0	2.50	12.00	5.00	5.00	0.0
75.0	3.75	16.00	7.50	7.50	0.0
100.0	5.00	20.00	10.00	10.01	0.1

TEST EQUIPMENT

INSTRUMENT		Calibration due	INSTRUMENT		Calibration due
NWS	Barometer	---	n/a	Thermometer	n/a
0084-000	Calibrator	25-Aug-2010	n/a	Electronic timer	n/a

This instrument is certified against standards which are supported by N.I.S.T. test #18010C.
 The calibration is performed by passing a calibrated flow through a calibrated instrument and then is collected in a calibrator. Here timing, collected volume, pressure and flow temperature measurements are performed. All instruments used in the calibration procedure are certified against standards traceable to N.I.S.T. Calibration uncertainty: ±1%FS.

REPORT NO: 0410:638	CALIBRATION DATE: 26-Apr-2010	RECALIBRATION DUE DATE: RECOMMENDED 12 MONTHS FROM PURCHASE DATE
TECHNICIAN SEKINDA	APPROVED BY: 	LAB. MANAGER OR AUTHORIZED PERSON

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MASS FLOW CALIBRATION DATA SHEET

CUSTOMER:	
PURCHASE ORDER NUMBER:	34273
SERIAL NUMBER:	247888-1
MODEL NUMBER:	FMA1720
GAS:	Nitrogen
FLOW RANGE:	0-10 L/min
CALIBRATION PRESSURE:	14.7PSIA
CALIBRATION TEMPERATURE:	70F(21.1C)
VOLTAGE INPUT:	12V
UNCERTAINTY (ACCURACY):	±1.5%FS

CALIBRATION DATA


PERCENT F.S RANGE (% F.S.)	LINEAR OUTPUT		NOMINAL FLOW (L/min)	ACTUAL FLOW (L/min)	DEVIATION (% F.S)
	(VDC)	(mA)			
0.0	0.00	4.00	0.00	0.00	0.0
25.0	1.25	8.00	2.50	2.54	0.4
50.0	2.50	12.00	5.00	4.97	-0.3
75.0	3.75	16.00	7.50	7.53	0.3
100.0	5.00	20.00	10.00	10.00	0.0

TEST EQUIPMENT

INSTRUMENT		Calibration due	INSTRUMENT		Calibration due
NWS	Barometer	---	n/a	Thermometer	n/a
0001-000	Calibrator	20-Oct-2010	n/a	Electronic timer	n/a

This instrument is certified against standards which are supported by N.I.S.T. test #18010C.

The calibration is performed by passing a calibrated flow through a calibrated instrument and then is collected in a calibrator. Here timing, collected volume, pressure and flow temperature measurements are performed. All instruments used in the calibration procedure are certified against standards traceable to N.I.S.T. Calibration uncertainty: +/-1%FS.

REPORT NO:	1109:548	CALIBRATION DATE:	30-Nov-2009	RECALIBRATION DUE DATE:	RECOMMENDED 12 MONTHS FROM PURCHASE DATE
TECHNICIAN	LASKOWSKA	APPROVED BY:			LAB. MANAGER OR AUTHORIZED PERSON

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