CERTIFICATE OF CALIBRATION

Customer: MESA LABORATORIES
12100 WEST 6TH AVE
LAKEWOOD, CO 80228

PO Number: PO-012012

ANAB ACCREDITED ISO/IEC 17025 ANSI/NCSL Z540-I ANAB AC-2489.02

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

Manufacturer: Ruska Instruments Corp.
Model Number: 7250i
Description: Pressure Calibrator
Serial Number: 69718
ID: TE10768

As-Found: In Tolerance
As-Left: In Tolerance

Calibration Date: Dec 26, 2017
Due Date: Dec 26, 2018

Calibrated To: Manufacturer Specification
Calibration Procedure: 1-AC79413-0

Transcat Calibration Laboratories have been audited and found in compliance with ISO /IEC 17025:2005. Accredited calibrations performed within the Lab's Scope of Accreditation are indicated by the presence of the Accrediting Body's Logo and Certificate Number. Any measurements on an accredited calibration not covered by that Lab's Scope of Accreditation are listed in the notes section of the certificate . SCC, NRC, CLAS or ANAB do not guarantee the accuracy of an individual calibration by accredited laboratories.

Transcat calibrations, as applicable, are performed in compliance with the requirements of the Transcat Quality Manual QAC -P01-000 Revision 1.0, the customer's Purchase Order and/or Quality Agreement requirements, ISO 9001:2008, ANSI/NCSL Z540.1-1994 (R2002). Complete records of work performed are maintained by Transcat and are available for inspection . Laboratory standards used in the performance of this calibration are listed below.

Transcat documents the traceability of measurements to the SI units through the National Institute of Standards and Technology (NIST), or the National Research Council of Canada (NRC), or other national measurement institutes (NMI) that are signatories to the CIPM Mutual Recognition Arrangement, or accepted fundamental and/or natural physical constants, or by the use of specified methods, consensus standards or ratio type measurements. Documentation supporting traceability information is available for review upon written request at a Transcat facility . The measured quantity and the measurement uncertainty are required for further dissemination of traceability.

Uncertainties are reported with a coverage factor k=2, providing a level of confidence of approximately 95%. All calibrations have been performed using processes having a TUR of 4:1 or better (3:1 for mass calibrations), unless otherwise noted. The Test Uncertainty Ratio (TUR) is calculated in accordance with NCSL International RP -18. For mass calibrations: Conventional mass referenced to 8.0 g/cm³.

The results in this report relate only to the item calibrated or tested. Recorded calibration data is valid at the time of calibration within the stated uncertainties at the environmental conditions noted. The determination of compliance to the specification is specific to the model/serial no./ID no. referenced above based on the tolerances shown; these tolerances are either the original equipment manufacturers (OEM's) warranted specifications or the client's requested specifications. This certificate may not be reproduced except in full, without the written approval of Transcat. Additional information, if applicable may be included on separate report(s).

Notes:

As-Found: In-Tolerance, No Adjustment Performed. All readings were normalized.

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ANAB AC-2489.02

ilac-MRA

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

As Found/As Left Data

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	OOT	Cal Process Uncertainty (k=2; ±)	Measurement Uncertainty (k=2; ±)	Units	TUR
Leak Test										
			P	P	P					
Pressure Linearity: 150psi Range										
	0.0000psi	±(0.00188 psi)	-0.0019	0.0019	0.0000 psi					
	4.6875psi	±(0.0407% Rdg)	4.6856	4.6894	4.6874 psi		7.0e-005	1.4e-004	psi	27.0 : 1
	14.0625psi	±(0.0153% Rdg)	14.0603	14.0647	14.0623 psi		2.1e-004	2.4e-004	psi	10.4 : 1
	23.4375psi	±(0.01097% Rdg)	23.4349	23.4401	23.4374 psi		3.5e-004	3.8e-004	psi	7.4 : 1
	32.8125psi	±(0.00943% Rdg)	32.8094	32.8156	32.8125 psi		4.9e-004	4.9e-004	psi	6.3 : 1
	46.8750psi	±(0.00901% Rdg)	46.8708	46.8792	46.8743 psi		7.0e-004	7.0e-004	psi	6.0 : 1
	65.6250psi	±(0.00901% Rdg)	65.6191	65.6309	65.6254 psi		9.8e-004	9.8e-004	psi	6.0 : 1
	93.7500psi	±(0.00901% Rdg)	93.7416	93.7584	93.7502 psi		1.4e-003	1.4e-003	psi	6.0 : 1
	131.2500psi	±(0.00901% Rdg)	131.2382	131.2618	131.2514 psi		2.0e-003	2.0e-003	psi	6.0 : 1
	150.0000psi	±(0.00901% Rdg)	149.9865	150.0135	149.9979 psi		2.3e-003	2.3e-003	psi	6.0 : 1
Pressure Hysteresis: 150psi Range										
	65.6250psi	±(0.00901% Rdg)	65.6191	65.6309	65.6258 psi		9.8e-004	9.8e-004	psi	6.0 : 1
	46.8750psi	±(0.00901% Rdg)	46.8708	46.8792	46.8768 psi		7.0e-004	7.0e-004	psi	6.0 : 1
	32.8125psi	±(0.00943% Rdg)	32.8094	32.8156	32.8134 psi		4.9e-004	4.9e-004	psi	6.3 : 1
Vacuum Linearity: 150psi Range										
	0.0000psi	±(0.0075 psi)	-0.0075	0.0075	0.0000 psi					
	-3.6250psi	±(0.20703% Rdg)	-3.6325	-3.6175	-3.6258 psi		5.4e-005	1.3e-004	psi	100.0 : 1
	-7.2500psi	±(0.10372% Rdg)	-7.2575	-7.2425	-7.2507 psi		1.1e-004	1.6e-004	psi	69.0 : 1
	-10.8750psi	±(0.06937% Rdg)	-10.8825	-10.8675	-10.8759 psi		1.6e-004	2.0e-004	psi	46.0 : 1
	-14.5000psi	±(0.05227% Rdg)	-14.5076	-14.4924	-14.5017 psi		2.2e-004	2.5e-004	psi	34.9 : 1
Vacuum Hysteresis: 150psi Range										
	0.0000psi	±(0.0075 psi)	-0.0075	0.0075	0.0000 psi					

Date Received: December 07, 2017
Service Level : R9

Customer Number: 1-549853-000

CERTIFICATE OF CALIBRATION

Customer: MESA LABORATORIES
12100 WEST 6TH AVE
LAKEWOOD, CO 80228

PO Number: PO-012012

ANAB ACCREDITED ISO/IEC 17025 ANSI/NCSL Z540-I
ANAB AC-2489.02

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

As Found/As Left Data

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	OOT	Cal Process Uncertainty (k=2; ±)	Measurement Uncertainty (k=2; ±)	Units	TUR
Barometric Reference Sensor Option										
	11.0000psia	±(0.002 psia)	10.9980	11.0020	10.9997 psia		1.7e-004	2.9e-004	psia	12.1 : 1
	13.0000psia	±(0.002 psia)	12.9980	13.0020	12.9995 psia		2.0e-004	3.0e-004	psia	10.3 : 1
	15.0000psia	±(0.002 psia)	14.9980	15.0020	14.9994 psia		2.3e-004	3.2e-004	psia	8.9 : 1

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CERTIFICATE OF CALIBRATION

Customer: MESA LABORATORIES
12100 WEST 6TH AVE
LAKEWOOD, CO 80228

PO Number: PO-012012

ANAB ACCREDITED ISO/IEC 17025 ANSI/NCSL Z540-1
ANAB AC-2489.02

ilac-MRA

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

Traceable Standards

Asset	Manufacturer	Model Number	Description	Cal Date	Due Date	Traceability Number	Use
5240	Cooper Instruments	SH66A	Thermometer	3-May-17	31-May-18	5-&5240-15-1	AF/AL
DW12HIGH	Ruska Instruments Corp.	2465-729	Deadweight Tester, Pneumatic	17-Jan-17	31-Jan-22	5-&DW12HIGH-1-1	AF/AL
DW12LOW	Ruska Instruments Corp.	2465-725	Deadweight Tester, Pneumatic	18-Jan-17	31-Jan-22	5-&DW12LOW-1-1	AF/AL
DW12MASS	Ruska Instruments Corp.	2465, Mass Set	Deadweight Tester, Pneumatic	18-Jan-17	31-Jan-18	5-&DW12MASS-1-1	AF/AL
DW12MID	Ruska Instruments Corp.	2465-727	Deadweight Tester, Pneumatic	18-Jan-17	31-Jan-22	5-&DW12MID-1-1	AF/AL

The use of the standard is defined as: AF - used for as-found readings, AL - used for as-left readings.

Environmental Data

Temperature	Relative Humidity	Temp / RH Asset
69.33°F /20.74°C	38.80%	DewK1

Calibrated At:
1181 Brittmoore Road
Houston, TX 77043

Facility Responsible:
1181 Brittmoore Road
Houston, TX 77043
800-828-1470

Unit Barcode: 0900B212965

Date Received: December 07, 2017
Service Level : R9

Calibrated By:
Electronically Signed By:
Michael Pennock
Michael Pennock — Dec 26, 2017 14:43:40 -06:00
Calibration Technician

Reviewed By:
Electronically Signed By:
Michael Valenzuela for
Scott D. Caine — Dec 26, 2017 08:03:51 -06:00
Lab Manager

Reprinted on December 29, 2017

Customer Number: 1-549853-000

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SUPPLEMENTAL REPORT

CALIBRATION LAB DATA AS FOUND / AS LEFT

Customer: MESA LABORATORIES

PO Number: PO-012012

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

Manufacturer: Ruska Instruments Corp.

Model Number: 7250i

Description: Pressure Calibrator

Serial Number: 69718

ID: TE10768

Service Type: R9

Calibration Date: Dec 26, 2017

Date Due: Dec 26, 2018

Calibration Procedure: 1-AC79413-0

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	OOT	Cal Process Uncertainty (k=2; ±)	Measurement Uncertainty (k=2; ±)	Units	TUR
Leak Test										
.			P	P	P					

The column labeled Cal Process Uncertainty (CPU) does not include the short term component of the UUT. The column labeled Measurement Uncertainty includes both CPU and the short term component of the UUT. TUR is calculated using CPU.

Note: Reported resolution of the UUT does not represent calibration uncertainty or accuracy of the UUT.

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SUPPLEMENTAL REPORT

CALIBRATION LAB DATA AS FOUND / AS LEFT

Customer: MESA LABORATORIES

PO Number: PO-012012

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	OOT	Cal Process Uncertainty (k=2; ±)	Measurement Uncertainty (k=2; ±)	Units	TUR
Pressure Linearity: 150psi Range										
	0.0000psi	±(0.00188 psi)	-0.0019	0.0019	0.0000 psi					
	4.6875psi	±(0.0407% Rdg)	4.6856	4.6894	4.6874 psi		7.0e-005	1.4e-004	psi	27.0 : 1
	14.0625psi	±(0.0153% Rdg)	14.0603	14.0647	14.0623 psi		2.1e-004	2.4e-004	psi	10.4 : 1
	23.4375psi	±(0.01097% Rdg)	23.4349	23.4401	23.4374 psi		3.5e-004	3.8e-004	psi	7.4 : 1
	32.8125psi	±(0.00943% Rdg)	32.8094	32.8156	32.8125 psi		4.9e-004	4.9e-004	psi	6.3 : 1
	46.8750psi	±(0.00901% Rdg)	46.8708	46.8792	46.8743 psi		7.0e-004	7.0e-004	psi	6.0 : 1
	65.6250psi	±(0.00901% Rdg)	65.6191	65.6309	65.6254 psi		9.8e-004	9.8e-004	psi	6.0 : 1
	93.7500psi	±(0.00901% Rdg)	93.7416	93.7584	93.7502 psi		1.4e-003	1.4e-003	psi	6.0 : 1
	131.2500psi	±(0.00901% Rdg)	131.2382	131.2618	131.2514 psi		2.0e-003	2.0e-003	psi	6.0 : 1
	150.0000psi	±(0.00901% Rdg)	149.9865	150.0135	149.9979 psi		2.3e-003	2.3e-003	psi	6.0 : 1
Pressure Hysteresis: 150psi Range										
	65.6250psi	±(0.00901% Rdg)	65.6191	65.6309	65.6258 psi		9.8e-004	9.8e-004	psi	6.0 : 1
	46.8750psi	±(0.00901% Rdg)	46.8708	46.8792	46.8768 psi		7.0e-004	7.0e-004	psi	6.0 : 1
	32.8125psi	±(0.00943% Rdg)	32.8094	32.8156	32.8134 psi		4.9e-004	4.9e-004	psi	6.3 : 1

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Note: Reported resolution of the UUT does not represent calibration uncertainty or accuracy of the UUT.

SUPPLEMENTAL REPORT

CALIBRATION LAB DATA AS FOUND / AS LEFT

Customer: MESA LABORATORIES

PO Number: PO-012012

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	OOT	Cal Process Uncertainty (k=2; ±)	Measurement Uncertainty (k=2; ±)	Units	TUR
Vacuum Linearity: 150psi Range										
	0.0000psi	±(0.0075 psi)	-0.0075	0.0075	0.0000 psi					
	-3.6250psi	±(0.20703% Rdg)	-3.6325	-3.6175	-3.6258 psi		5.4e-005	1.3e-004	psi	100.0 : 1
	-7.2500psi	±(0.10372% Rdg)	-7.2575	-7.2425	-7.2507 psi		1.1e-004	1.6e-004	psi	69.0 : 1
	-10.8750psi	±(0.06937% Rdg)	-10.8825	-10.8675	-10.8759 psi		1.6e-004	2.0e-004	psi	46.0 : 1
	-14.5000psi	±(0.05227% Rdg)	-14.5076	-14.4924	-14.5017 psi		2.2e-004	2.5e-004	psi	34.9 : 1
Vacuum Hysteresis: 150psi Range										
	0.0000psi	±(0.0075 psi)	-0.0075	0.0075	0.0000 psi					

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SUPPLEMENTAL REPORT

CALIBRATION LAB DATA AS FOUND / AS LEFT

Customer: MESA LABORATORIES

PO Number: PO-012012

Certificate/SO Number: 5-B5D5W-20-1 Revision 0

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	OOT	Cal Process Uncertainty (k=2; ±)	Measurement Uncertainty (k=2; ±)	Units	TUR
Barometric Reference Sensor Option										
	11.0000psia	±(0.002 psia)	10.9980	11.0020	10.9997 psia		1.7e-004	2.9e-004	psia	12.1 : 1
	13.0000psia	±(0.002 psia)	12.9980	13.0020	12.9995 psia		2.0e-004	3.0e-004	psia	10.3 : 1
	15.0000psia	±(0.002 psia)	14.9980	15.0020	14.9994 psia		2.3e-004	3.2e-004	psia	8.9 : 1

As Found and As Left Data recorded on December 26, 2017

Temperature 69.3°F / 20.7°C Relative Humidity 39% Temp/RH Asset DewK1

Asset	Manufacturer	Model	Description	Cal Date	Due Date	Traceability Numbers
5240	Cooper Instruments	SH66A	Thermometer	May 03, 2017	May 31, 2018	5-&5240-15-1
DW12HIGH	Ruska Instruments Corp.	2465-729	Deadweight Tester, Pneumatic	Jan 17, 2017	Jan 31, 2022	5-&DW12HIGH-1-1
DW12LOW	Ruska Instruments Corp.	2465-725	Deadweight Tester, Pneumatic	Jan 18, 2017	Jan 31, 2022	5-&DW12LOW-1-1
DW12MASS	Ruska Instruments Corp.	2465, Mass Set	Deadweight Tester, Pneumatic	Jan 18, 2017	Jan 31, 2018	5-&DW12MASS-1-1
DW12MID	Ruska Instruments Corp.	2465-727	Deadweight Tester, Pneumatic	Jan 18, 2017	Jan 31, 2022	5-&DW12MID-1-1

Remarks

As-Found: In-Tolerance, No Adjustment Performed. All readings were normalized.

The column labeled Cal Process Uncertainty (CPU) does not include the short term component of the UUT. The column labeled Measurement Uncertainty includes both CPU and the short term component of the UUT. TUR is calculated using CPU.

Note: Reported resolution of the UUT does not represent calibration uncertainty or accuracy of the UUT.