



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Test Solutions de Mexico, S.A. de C.V.

Via Rápida Oriente #17228-3, Tercera Etapa Rio Tijuana

Tijuana B.C., C.P. 22226

Satellite Site:

Blvd. Lopez Mateos #2290-4, Centro Commercial Castellón, Mexicali Baja California

has been assessed by ANAB

and meets the requirements of international standard

ISO/IEC 17025:2005

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

while demonstrating technical competence in the fields of

CALIBRATION AND TESTING

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations and/or tests to which this accreditation applies.

AC-1364

Certificate Number



ANAB Approval

Certificate Valid: 10/31/2017-01/05/2019
Version No. 008 Issued: 10/31/2017



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
AND ANSI/NCSL Z540-1-1994 (R2002)**

Test Solutions de México, S.A. de C.V.

Vía Rápida Oriente #17228-3 Tercera Etapa Rio Tijuana
Tijuana B.C., C.P. 22226

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CALIBRATION

Valid to: **January 5, 2019**

Certificate Number: **AC-1364**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage - Source	(1 to 100) μ V 100 μ V to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.1 kV	13 μ V 37 μ V/V + 9 μ V 49 μ V/V + 5 μ V 64 μ V/V - 47 μ V 76 μ V/V + 0.45 mV 46 μ V/V + 9.7 mV	Fluke 5500A
DC Current - Source	Up to 190 μ A 190 μ A to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 10) A	2.1 μ A 0.51 μ A/A + 2 μ A 1.1 μ A/A + 20 nA 2.7 mA/A - 52 μ A 1.4 mA/A + 0.38 mA 2.5 mA/A + 2 mA	Fluke 5500A
AC Voltage - Source	(1 to 30) mV Up to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (30 to 330) mV Up to 45 Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	60 μ V 71 μ V 89 μ V 0.27 mV 1.7 mV 1.4 mV/V + 17 μ V 1.5 mV/V + 16 μ V 1.5 mV/V + 26 μ V 1.2 mV/V + 54 μ V 7.8 mV/V + 28 μ V 51 mV/V + 0.18 mV	Fluke 5500A



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source	330 mV to 3.3 V		Fluke 5500A
	Up to 45 Hz	1.5 mV/V	
	45 Hz to 10 kHz	1.5 mV/V + 16 μV	
	(10 to 20) kHz	1.5 mV/V + 36 μV	
	(20 to 50) kHz	2.7 mV/V	
	(50 to 100) kHz	7.9 mV/V + 22 μV	
	(100 to 300) kHz	51.5 mV/V	
	(3.3 to 33) V		
	Up to 45 Hz	1.5 mV/V	
	45 Hz to 10 kHz	1.5 mV/V	
	(10 to 20) kHz	1.5 mV/V + 67 μV	
	(20 to 50) kHz	2.7 mV/V + 89 μV	
	(50 to 100) kHz	7.9 mV/V + 220 μV	
	(33 to 330) V		
Up to 45 Hz	1.2 mV/V + 7.8 mV		
45 Hz to 1 kHz	1.2 mV/V + 8 mV		
(1 to 10) kHz	1.3 mV/V + 6 mV		
(10 to 20) kHz	1.3 mV/V + 7.3 mV		
(330 to 750) V			
Up to 45 Hz	6.5 mV/V + 0.2 V		
45 Hz to 1 kHz	6.5 mV/V + 0.2 V		
(1 to 10) kHz	6.8 mV/V + 0.2 V		
AC Current - Source	(1 to 330) μA		Fluke 5500A
	Up to 45 Hz	17 μA	
	45 Hz to 1 kHz	12 μA	
	330 μA to 3.3 mA		
	Up to 45 Hz	20 μA/A + 10 μA	
	45 Hz to 1 kHz	5.1 μA/A + 10 μA	
	(3.3 to 33) mA		
	Up to 45 Hz	20 μA/A + 10 μA	
	45 Hz to 1 kHz	5.1 μA/A + 10 μA	
	(33 to 330) mA		
	Up to 45 Hz	1.2 μA/A + 0.4 mA	
	45 Hz to 1 kHz	1.1 μA/A + 0.4 mA	
	(1 to 5) kHz	1.1 μA/A + 0.4 mA	
	330 mA to 2.2 A		
Up to 45 Hz	3.3 mA/A + 0.3 mA		
45 Hz to 1 kHz	2.6 mA/A + 78 μA		
(1 to 5) kHz	4 mA/A + 555 μA		



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Source	(2.2 to 10) A Up to 45 Hz 45 Hz to 1 kHz	14 mA/A + 25 mA 16 mA/A + 29 mA	Fluke 5500A
Resistance	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 k Ω to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ	0.5 mΩ/Ω + 3.4 mΩ 0.13 mΩ/Ω + 3.9 mΩ 0.17 mΩ/Ω + 2.6 mΩ 99 μΩ/Ω + 10 mΩ 0.22 mΩ/Ω - 29 mΩ 0.1 mΩ/Ω + 0.1 Ω 0.2 mΩ/Ω - 0.29 Ω 0.1 mΩ/Ω + 0.98 Ω 0.2 mΩ/Ω - 2.8 Ω 0.1 mΩ/Ω + 9.9 Ω 0.65 mΩ/Ω - 0.17 kΩ 0.41 mΩ/Ω + 95 Ω 13 mΩ/Ω - 40 kΩ 8.4 mΩ/Ω + 6 kΩ	Fluke 5500A
Electrical Simulation of Thermocouple indicating devices	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 820) °C Type C (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C Type E (-250 to -100) °C (-100 to -25) °C (-25 to 650) °C (650 to 1 000) °C Type J (-210 to -100) °C (-100 to 760) °C (760 to 1 200) °C	1.5 °C 1.2 °C 1.1 °C 0.79 °C 0.78 °C 0.95 °C 1.3 °C 2.3 °C 0.83 °C 0.69 °C 0.68 °C 0.62 °C 0.79 °C 0.54 °C 0.7 °C	Fluke 5500A



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple indicating devices	Type K (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C Type L (-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.89 °C 0.55 °C 0.54 °C 0.7 °C 0.92 °C 0.83 °C 0.58 °C 0.68 °C	Fluke 5500A

Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers Outside Inside	(1 to 6) in 1 and 2 in	(410 + 7L) µin 580 µin	Gage Blocks Ring Gages
Micrometers Inside Outside	Up to 1 in (1 to 6) in	40 µin 74 µin	Gage Blocks

Mass

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances	Up to 16 oz (1 to 5) lb (5 to 10) lb (10 to 100) lb	0.004 oz 0.000 4 lb 0.000 8 lb 0.02 lb	Class F & Cast Iron Weights
	Up to 500 g 500 g to 2.2 kg (2.2 to 4.4) kg (4.4 to 45) kg	0.12 g 0.16 g 0.37 g 6.4 g	
Torque	(10 to 100) lbf-in (100 to 600) lbf-in	0.67 lbf-in 1.3 lbf-in	Mountz S-50 Mountz S-100



Mass

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Flow Meters	Up to 2 ml/min (2 to 20) ml/min (20 to 200) ml/min (200 to 2 000) ml/min (2 000 to 20 000) ml/min	110 µl/min (0.007F + 0.092) ml/min (0.011F + 0.011) ml/min (0.015F - 0.82) ml/min (0.015F + 0.890) ml/min	Ateq CDF
Pressure	(-12 to 300) psi	0.07 psi	Fluke 725 with Fluke 700P27
	(100 to 5 000) psi	0.83 psi	Ametek PPC 350 BAR
Pipettes and Other Volumetric Devices ¹	100 µL 1 mL 5 mL 25 mL 100 mL 250 mL 500 mL 1 000 mL 4 000 mL 6 000 mL	1.4 µl 1.4 µl 4.2 µl 12 µl 54 µl 67 µl 0.16 ml 0.46 ml 1.1 ml 1.6 ml	Ohaus EX-225D A&D GX-1000 Ohaus EX-10202

TESTING

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Mechanical	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room	Clean Room	ISO 14644, Part 1 & 3, IEST-RPCC006.3
		Terminal HEPA Filter	ISO 14644, Part 3, IEST-RP-CC034.4



Services performed at satellite location

Blvd. Lopez Mateos #2290-4, Centro Comercial Castellón

Mexicali, Baja California

Fernando Garcia 686 561 9322, 9326 and 9327

fernando.garcia@testsolutionsmexico.com

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage - Source	(1 to 100) μ V 100 μ V to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.1 kV	13 μ V 37 μ V/V + 9 μ V 49 μ V/V + 5 μ V 64 μ V/V + 47 μ V 76 μ V/V + 0.45 mV 46 μ V/V + 9.7 mV	Fluke 5500A
DC Current - Source	Up to 190 μ A 190 μ A to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 10) A	2.1 μ A 0.51 μ A/A + 2 μ A 1.1 μ A/A + 20 nA 2.7 mA/A - 52 μ A 1.4 mA/A + 0.38 mA 2.5 mA/A + 2 mA	Fluke 5500A
AC Voltage - Source	(1 to 30) mV Up to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (30 to 330) mV Up to 45 Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	60 μ V 71 μ V 89 μ V 0.27 mV 1.7 mV 1.4 mV/V + 17 μ V 1.5 mV/V + 16 μ V 1.5 mV/V + 26 μ V 1.2 mV/V + 54 μ V 7.8 mV/V + 28 μ V 51 mV/V + 0.18 mV	Fluke 5500A



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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source	330 mV to 3.3 V		Fluke 5500A
	Up to 45 Hz	1.5 mV/V	
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	(10 to 20) kHz	1.5 mV/V + 36 μV	
	(20 to 50) kHz	2.7 mV/V	
	(50 to 100) kHz	7.9 mV/V + 22 μV	
	(100 to 300) kHz	51.5 mV/V	
	(3.3 to 33) V		
	Up to 45 Hz	1.5 mV/V	
	45 Hz to 10 kHz	1.5 mV/V	
	(10 to 20) kHz	1.5 mV/V + 67 μV	
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	(33 to 330) V		
Up to 45 Hz	1.2 mV/V + 7.8 mV		
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AC Current - Source	(1 to 330) μA		Fluke 5500A
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	Up to 45 Hz	20 μA/A + 10 μA	
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	Up to 45 Hz	20 μA/A + 10 μA	
	45 Hz to 1 kHz	5.1 μA/A + 10 μA	
	(33 to 330) mA		
	Up to 45 Hz	1.2 μA/A + 0.4 mA	
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	(1 to 5) kHz	1.1 μA/A + 0.4 mA	
	330 mA to 2.2 A		
Up to 45 Hz	3.3 mA/A + 0.3 mA		
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(1 to 5) kHz	4 mA/A + 555 μA		

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Source	(2.2 to 10) A Up to 45 Hz 45 Hz to 1 kHz	14 mA/A + 25 mA 16 mA/A + 29 mA	Fluke 5500A
Resistance	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 k Ω to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ	0.5 mΩ/Ω + 3.4 mΩ 0.13 mΩ/Ω + 3.9 mΩ 0.17 mΩ/Ω + 2.6 mΩ 99 μΩ/Ω + 10 mΩ 0.22 mΩ/Ω - 29 mΩ 0.1 mΩ/Ω + 0.1 Ω 0.2 mΩ/Ω - 0.29 Ω 0.1 mΩ/Ω + 0.98 Ω 0.2 mΩ/Ω - 2.8 Ω 0.1 mΩ/Ω + 9.9 Ω 0.65 mΩ/Ω - 0.17 kΩ 0.41 mΩ/Ω + 95 Ω 13 mΩ/Ω - 40 kΩ 8.4 mΩ/Ω + 6 kΩ	Fluke 5500A
Electrical Simulation of Thermocouple indicating devices	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 820) °C Type C (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C Type E (-250 to -100) °C (-100 to -25) °C (-25 to 650) °C (650 to 1 000) °C Type J (-210 to -100) °C (-100 to 760) °C (760 to 1 200) °C	1.5 °C 1.2 °C 1.1 °C 0.79 °C 0.78 °C 0.95 °C 1.3 °C 2.3 °C 0.83 °C 0.69 °C 0.68 °C 0.62 °C 0.79 °C 0.54 °C 0.7 °C	Fluke 5500A



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple indicating devices	Type K (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C Type L (-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.89 °C 0.55 °C 0.54 °C 0.7 °C 0.92 °C 0.83 °C 0.58 °C 0.68 °C	Fluke 5500A

Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers Outside Inside	(1 to 6) in 1 and 2 in	(410 + 7L) μin 580 μin	Gage Blocks Ring Gages
Micrometers Inside Outside	Up to 1 in (1 to 6) in	40 μin 74 μin	Gage Blocks

Mass

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances	Up to 16 oz (1 to 5) lb (5 to 10) lb (10 to 100) lb	0.004 oz 0.000 4 lb 0.000 8 lb 0.02 lb	Class F & Cast Iron Weights
	Up to 500 g 500 g to 2.2 kg (2.2 to 4.4) kg (4.4 to 45) kg	0.12 g 0.16 g 0.37 g 6.4 g	
Torque	(10 to 100) lbf-in (100 to 600) lbf-in	0.67 lbf-in 1.3 lbf-in	Mountz S-50 Mountz S-100



Mass

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Flow Meters	Up to 2 ml/min (2 to 20) ml/min (20 to 200) ml/min (200 to 2 000) ml/min (2 000 to 20 000) ml/min	110 µl/min (0.007F + 0.092) ml/min (0.011F + 0.011) ml/min (0.015F - 0.82) ml/min (0.015F + 0.890) ml/min	Ateq CDF
Pressure	(-12 to 300) psi	0.07 psi	Fluke 725 with Fluke 700P27
	(100 to 5 000) psi	0.83 psi	Ametek PPC 350 BAR

TESTING

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Mechanical	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room	Clean Room	ISO 14644, Part 1 & 3, IEST-RPCC006.3
		Terminal HEPA Filter	ISO 14644, Part 3, IEST-RP-CC034.4

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. F = flow in ml/min, L = length in.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1364.



 Vice President
