



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

AMETEK SINGAPORE PTE LTD  
 (COMPLIANCE TEST SOLUTIONS)  
 43 Changi South Avenue 2, #04-01  
 SINGAPORE 486164  
 Frankie Chua Phone: 65 6484 2388

CALIBRATION


Valid To: December 31, 2019

Certificate Number: 2939.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,3</sup> (±)	Comments
DC Voltage – Measure	(1 to 750) V	0.41 %	HP 3458A, Brandenburg 139D HV meter
	> 750 V to 40 kV	0.5 %	Brandenburg 149-03 HV meter
AC Voltage – Measure  RMS 10 Hz to 50 kHz	(1 to 750) V	0.51 %	HP 3458A
	Peak and Peak-to-Peak 1 Hz to 1 GHz	40 mV to 18 kV	1.8 %
DC Current – Measure	(0.1 to 1) A	0.45 %	HP 3458A shunt with DMM
	(1 to 25) A	1.6 %	

(A2LA Cert. No. 2939.01) 12/14/2017 

Parameter/Equipment	Range	CMC <sup>2,3</sup> (±)	Comments
AC Current – Measure (10 Hz to 50 kHz)	(0.1 to 1) A (1 to 25) A	1.3 % 1.6 %	HP 3458A shunt with DMM
DC Resistance – Measure	1 mΩ to 750 MΩ	1.5 % + 0.3 mΩ	HP 3458 A
EFT Simulators –			
Voltage	250 V to 8 kV ± 10 %	2.7 %	IEC 61000-4-4 (2012), IEEE Std C62.41.2 (2002)  Lecroy 7300A, Lecroy 625Zi, Teseq CAS 3025
Rise Time	5 ns ± 30 %	3 %	
Pulse Width	(35 to 150) ns	2.6 %	
Burst Duration/Period	(0.75 to 300) ms	0.47 %	
Repetition	(5 to 100) kHz	0.68 %	
ESD Simulators –			
Contact Voltage	(750 to 40k) V ± 5 %	0.5 %	IEC 61000-4-2 (2008); ISO 10605 (2008 + A1 2014)  Brandenburg HV meter 139D/149-03, HP3458A DMM, Lecroy 7300A, Lecroy 625Zi, Teseq MD103 ESD target
Rise Time	(0.6 to 1) ns	8.3 %	
Peak Current	(7.5 to 112.5) A ± 15 %	3.7 %	
T <sub>1</sub> Current	(0.275 to 60) A ± 30 %	3.7 %	
T <sub>2</sub> Current	(0.15 to 30) A ± 30 %	3.7 %	
PQT Simulators –			
Pulse Rise/Fall Time	(1 to 5) μs	4.6 %	IEC 61000-4-11 (2004 + A1 2017)  Lecroy 7300A oscilloscope, Lecroy 625Zi oscilloscope, Teseq MD 200A HV probe, Tektronix HV probe P6015A, HILO shunt ISM 50/2, HP 3458A
Phase Angle	(0 to 360)° ± 10°	0.23 %	
Voltage Measurement	Up to 240 V <sub>AC</sub>	1.8 %	
Time Interval	1 ms to 1 s	1.2 %	
Overshoot/Undershoot	< 5 %	1.6 %	
Inrush Current	(500 to 600) A	1.9 %	

Parameter/Equipment	Range <sup>3</sup>	CMC <sup>2,3</sup> (±)	Comments
Ring Wave Simulators –			
Rise Time			
Open Circuit	0.5 μs ± 30 %	4.0 %	IEC 61000-4-12 (2017), IEEE Std. C62.41.2 (2002)
Short Circuit	(0.2 to 1) μs	4.0 %	
Open Circuit Phase Shift	(0 to 360)° ± 10°	0.12 %	Lecroy 7300A, Lecroy 625Zi, MD 200A HV probe, Tektronix HV probe P6015A, HILO ISM 50/2 shunt
Open Circuit Voltage	(0.2 to 6.6) kV ± 10 %	1.9 %	
Short Circuit Current	(6 to 550) A ± 10 %	1.8 %	
Oscillation Frequency	100 kHz ± 30 %	0.19 %	
Output Impedance	(12, 30) Ω ± 20 %	2.6 %	
Decaying	(40 to 110) %	2.7 %	
Surge Simulators –			
Rise Time			
Open Circuit	(1 to 10) μs ± 30 %	3.8 %	IEC 61000-4-5 (2005, 2014 + A1 2017), IEEE Std C62.41.2 (2002)
Short Circuit	(1 to 8) μs ± 20 %	2.2 %	
Pulse Width			Lecroy 7300A oscilloscope, Lecroy 625Zi oscilloscope, Teseq MD 200A HV probe, Tektronix HV probe P6015A, HILO shunt ISM 50/2 shunt
Open Circuit	(35 to 1000) μs ± 20 %	2.2 %	
Short Circuit	(10 to 320) μs ± 20 %	1.7 %	
Open Circuit Phase Shift	(0 to 360)° ± 10°	0.13 %	
Open Circuit Voltage	500 V to 6.6 kV ± 10 %	2.1 %	
Short Circuit Current	80 A to 3.3 kA ± 20 %	1.9 %	

Parameter/Equipment	Range	CMC <sup>2,3</sup> (±)	Comments
Transient Generators –			
Transient Peak Voltage	10 V to 18 kV	1.8 %	ISO 7637-1 (2015), ISO 16750-2 (2012)
Rise/Fall Time	(500 to 800) ps > 800 ps to 3 ns (> 3 to 10) ns > 10 ns to 20 ms	8.5 % 5.6 % 2.6 % 2.3 %	Lecroy 7300A oscilloscope, Lecroy 625Zi oscilloscope, Lecroy HVP 120 HV probe, Teseq MD 200A HV probe, Tektronix HV probe P6015A, HILO ISM 50/2 shunt, RF attenuators/loads
Pulse Width	500 ps to 1 ns > 1 ns to 10 s	5.1 % 1.3 %	

## II. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2,3</sup> (±)	Comments
Frequency	10 Hz to 100 kHz	0.1 %	HP 3458A
	1 Hz to 1 GHz	1.2 %	Lecroy 7300A, Lecroy 625Zi

<sup>1</sup> This laboratory offers commercial calibration service.

<sup>2</sup> Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMC's represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

<sup>3</sup> In the statement of CMC and indication of Range values, percentages are to be read as percent of reading or indication, unless noted otherwise.



## *Accredited Laboratory*

A2LA has accredited

# **AMETEK SINGAPORE PTE LTD. (COMPLIANCE TEST SOLUTIONS)**

*Singapore, SINGAPORE*

for technical competence in the field of

## Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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 8 January 2009).



Presented this 14<sup>th</sup> day of December 2017.

A handwritten signature in black ink, written over a horizontal line.

President and CEO  
For the Accreditation Council  
Certificate Number 2939.01  
Valid to December 31, 2019

*For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.*