SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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MECHANICAL

Valid To: November 30, 2019 Certificate Number: 3521.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests on: Automotive, Aerospace, Medical, Military and Electrical, Electronic and Mechanical components, assemblies and packaging:

Test Type/Equipment Capabilities	**Test Method**
Temperature Testing[1] Temperature range: (-65 to +150) °C	IEC 60068-2-1; IEC 60068-2-2; IEC 60068-2-78; MIL-STD 810E/F/G Sec. 502; MIL-STD 883G/H, Sec. 1011; RTCA DO-160 D, E, F, G Sec. 4.0
Thermal Shock/ Temperature Cycling[1] Temperature range: (-65 to +150) °C	IEC 60068-2-14; MIL-STD 202G Sec. 107; MIL-STD 810E/F/G Sec. 501, 503, 520; MIL-STD 883G/H, Sec. 1010; RTCA DO-160 D, E, F, G Sec. 5.0
Temperature Humidity Testing	IEC 60068-2-30; IEC 60068-2-38; IEC 60068-2-78; IEC 60068-3-4; MIL-STD 810E/F/G Sec. 507; MIL-STD 202G Sec. 103, 106; MIL-STD 883G/H Sec. 1004; RTCA DO-160 D, E, F, G Sec. 6.0; ISTA 2A, 3A, 6A

Test Type/Equipment Capabilities	**Test Method**
Shock and Vibration Testing using Electro Dynamic Shaker[1] Random: Frequency Range: (10 to 3,000) Hz Shock: 45g's Sine: Frequency Range: (10 to 3,000) Hz	IEC 60068-2-6; IEC 60068-2-27; IEC 60068-2-47; IEC 60068-2-59; IEC 60068-2-64; MIL-STD 810E/F/G Sec. 514.5, 516, 519.5; MIL-STD 883G/H Sec. 2002, 2005, 2007; MIL-STD 202G Sec. 201, 204, 213, 214; RTCA DO-160 D, E, F, G Sec. 7.0, 8.0; ISTA 2A, 3A, 6A
Salt Fog Chamber Testing	IEC 60068-2-11; MIL-STD 202G Sec. 101; MIL-STD 810E/F/G Sec. 509; MIL-STD 883G/H Sec. 1009; RTCA DO-160 D, E, F, G Sec. 14.0
Constant Acceleration Testing[1] Up to 20 G Forces	IEC 60068-2-7; MIL-STD 810E/F/G Sec. 513; MIL-STD 202G method 212A
Crash Safety Testing	RTCA DO-160 D, E, F, G Sec. 7.3
Altitude Testing[1] (-1,500 to 100,000) Feet Temperature Range (-65 to +150) °C	RTCA DO-160, D, E, F, G Sec. 4.0
Rapid Decompression and Overpressure	RTCA DO-160, D, E, F, G Sec. 4.0
Waterproofness Testing	IEC 60529; MIL-STD 810E/F/G Sec. 506; RTCA DO-160, D, E, F, G Sec. 10.3.2 Drip Test and Sec. 10.3.3 Spray Test
Drop Testing	ISTA 2A, 3A, 6A
Compression Testing	ISTA 2A, 3A, 6A

Electrical Testing

Electrical Power Input (AC)

- Normal Operating Conditions
  - Voltage and Frequency
  - Voltage Modulation
  - Frequency Modulation
  - Momentary Power Interruption
  - Normal Transients
    - Normal Surge Voltage
    - Normal Frequency Transients
  - Normal Frequency Variations
  - Voltage DC Content
  - Voltage Distortion
- Abnormal Operating Conditions
  - Abnormal Voltage and Frequency Limits in Steady State
  - Momentary Under-Voltage Operation
  - Abnormal Transients
    - Abnormal Surge Voltage
    - Abnormal Frequency Transients
    - Abnormal Frequency Variations
  - Loss of Phase Input (3-Phase AC Input Only)

Electrical Power Input (DC)

- Normal operating Conditions
  - Voltage (Average Value)
  - Ripple Voltage
  - Momentary Power Interruptions
  - Normal Surge Voltage
  - Engine Starting Under Voltage Operation
  - Exposed Voltage Decay Time (DC, Category D Equipment only)
- Abnormal Operating Conditions
  - Voltage Steady State
  - Low Voltage Conditions
  - Momentary Under-Voltage Operation
  - Abnormal Surge Voltage

Load Equipment Influence on Electrical Power System (AC/DC)

- Current Harmonics Emissions from Loads (AC).
- Allowable Phase Unbalance (3-Phase AC Input Only)
- DC Current Content I Steady-State Operation (All AC Equipment)
- Regenerated Energy (DC)
- Inrush Current (AC/DC)

Applicable Standards:
RTCA Do-160G Sec 16.0, Power Input;
IEC 61000-4-13;
IEC 61000-4-11

Electrical Testing (cont'd)

Load Equipment Influence on Electrical Power System (AC/DC) *(cont.)*

- Current Modulation in Steady-State Operation (AC)
- DC Current Ripple (DC)
- Power Factor (All AC Equipment)

[1]Including Customer Specifications directly related to the test technologies and within the equipment capabilities/parameters listed above

Accredited Laboratory

A2LA has accredited

CASCADE ENGINEERING SERVICES, INCORPORATED

Redmond, WA

for technical competence in the field of

Mechanical Testing

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 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 29th day of November 2017.

President & CEO
For the Accreditation Council
Certificate Number 3521.01
Valid to November 30, 2019

For the types of tests to which this accreditation applies, please refer to the laboratory's Mechanical Scope of Accreditation.