SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELEMENT MATERIALS TECHNOLOGY PORTLAND[1]
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MECHANICAL

Valid To: January 31, 2021 Certificate Number: 2582.01

In recognition of the successful completion of the A2LA evaluation process accreditation is granted to this laboratory listed above, as well as, the satellite location listed below to perform the following tests on aircraft components, automotive components, marine components, coatings, packaging and containers, electronics, fasteners, and consumer goods:

Test Description/ Parameters	**Test Method**
Mechanical Vibration Sine Random Sine-on-Random Gunfire Range[2]: Frequency (1-3,000) Hz Stroke 6” Force up to 12,000 lbs.	MIL-STD 810 E, F, G Methods 514, 519; MIL-STD 167-1 (A SHIPS); MIL-STD 202 G Methods 201, 204, 214; MIL-STD 883 G, H Methods 2005, 2007; MIL-STD 1344 A Method 2005; RTCA DO-160 D, E, F, G Sec. 8.0; RTCA DO-227 6/23/1995 Sec. 2.3.1; JESD22 B103B; SAE J1455 Sec. 4.10; BellCore GR-63-CORE 5.4.2, 5.4.3; IEC 68-2-59, Test Fe; IEC 68-2-34, Test Fd; IEC 68-2-35, Test Fda; IEC 68-2-6, Test Fc; SAE J1211; ASTM D4169; UN ST/SG/AC.10/11/Rev.5 Para. 38.3.4.3
Loose Cargo	ASTM D4169
Stacking	ASTM D4169
Handling Drop	ASTM D4169

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Test Description/ Parameters	**Test Method**
Packaging Drop	ASTM D4169
Impact	ASTM D4169
Mechanical Shock Range[2]: Drop Shock Force 1, 000 g Period (1 to 40) ms Vibration Shock Stroke 2” Force up to 15,000 lbs Period (1 to 30) ms	MIL-STD 810 E, F, G Method 516; MIL-STD 202 G Method 213; MIL-STD 883 G, H Method 2002; MIL-STD 1344 A Method 2004; RTCA DO-160 D, E, F, G Sec. 7.0; RTCA DO-227 6/23/1995 Sec. 2.3.2; JESD22 B104C Conditions A, B, C and D; SAE J1455 Sec. 4.9; IEC 68 Part 2 Ea, Eb; SAE J1211; UN ST/SG/AC.10/11/Rev. 3 Para. 38.3.4.4
Acceleration Range[2]: r = 52” RPM = 170	MIL-STD 810 E, F, G Method 513; MIL STD 202 G Method 212; MIL-STD 1344 A Method 2011; RTCA DO-160 D, E, F, G Sec. 7.3
Thermal (Temperature) High/Low Temperature Thermal Shock Temperature Cycling Range[2]: High 400 ºC Low -100 ºC Temperature Shock (-70 to 150) ºC	MIL-STD 810 E, F, G Methods 501, 502; RTCA DO-160 D, E, F, G Sec. 4.5; BellCore GR-63-CORE 5.1.1.1, 5.1.1.2; IEC 68-2-1, Test A; IEC 68-2-2, Test B; JESD22-A104C; JESD22-A106B; MIL-STD 883 G, H Method 1011; MIL-STD 810 E, F, G Method 503; MIL-STD 202 G Method 107; MIL STD 883 G, H Method 1010; MIL-STD 1344 A Method 1003; RTCA DO-160 D, E, F, G Sec. 5.0; RTCA DO-227 6/23/1995 Sec. 2.3.3; SAE J1455 Sec. 4.1; SAE J1211; UN ST/SG/AC.10/11/Rev.5 Para. 38.3.4.2

Test Description/ Parameters	**Test Method**
Temperature/Humidity Range[2]: (10 to 95)%RH (5 to 95) º C	MIL-STD 810 E, F, G Method 507 Table IV, V, VIII, IX; MIL-STD 202 G Methods 103, 106; MIL-STD 883 G, H Method 1004; MIL-STD 1344 A Method 1002; RTCA DO-160 D, E, F, G Sec. 6.0; RTCA DO-227 6/23/1995 Sec. 2.3.6; SAE J1455 Sec. 4.2; BellCore GR-63-CORE 5.1.1.3, 5.1.2; IEC 68-2-30, Test Db; SAE J1211
Salt Spray Salt Fog Corrosion	ASTM B117, G86 Sec. 1.1.3; MIL-STD 810 E, F, G Method 509; MIL-STD 202 G Method 101; MIL-STD 883 G, H Method 1009; MIL-STD 1344 A Method 1001; RTCA DO-160 D, E, F, G Sec. 14.0; SAE J1455 Sec. 4.3; IEC 68-2-52, Test Kb; SAE J2334; GM 9540P; NEMA 250 Sec. 5.8, 5.9
Evaluation: Corrosion Creep-Back	ASTM D1654
Evaluation: Tape Adhesion	ASTM D3359
Altitude (Barometric Pressure) Temperature Altitude Range[2]: Up to 100,000 ft (-70 to 140) ºC	MIL-STD 810 E, F, G Methods 500, 520; MIL-STD 202 G Method 105; MIL-STD 883 G, H Method 1001; MIL-STD 1344 A Method 1011; NASA MSFC-SPEC-548; SAE J1455 Sec. 4.9; SAE J1211; UN ST/SG/AC.10/11/Rev.5 Para. 38.3.4.1
Altitude Rapid Decompression/Overpressure Range[2]: Up to 100 psia	RTCA DO-160 D, E, F, G Sec. 4.6; RTCA DO-227 6/23/1995 Sec. 2.3.4, 2.3.5; MIL-STD-810 E, F, G Method 500.5
Combined Environment	MIL-STD 810 E, F, G Method 520
Drop Shock Corner, Edgewise, Flat	ASTM D4169; BellCore GR-63-CORE Sec. 5.3

Test Description/ Parameters	**Test Method**
Rain, Wind and Rain, Drip	MIL-STD-810 E, F, G Method 506
Dust Settling	IEC 60529 Sec. IP5X, IP6X
Waterproofness/Drip	RTCA DO-160 D, E, F, G Sec. 10.0; MIL-STD-810 E, F, G Method 512; SAE J1211; NEMA 250 Sec. 5.7; IEC 60529 Sec. IP X1, IP X2, IP X3, IP X4, IP X5, IP X6, IP X7, IP X8
Icing/Freezing Rain	MIL-STD-810 E, F, G Method 521; RTCA DO-160 D, E, F, G Sec. 24; NEMA 250 Sec. 5.6
UV Fluorescent Light Exposure	ASTM G154; ISO 4892-3; SAE J2020
Xenon Weathering Test	MIL-STD-810 E, F, G Method 505; ISO 4892-2; SAE J1885
Protection Against Solid Foreign Objects	IEC 60529 Sec. IP 1X, IP 2X, IP 3X, IP 4X, IP 5X, IP 6X
Fluid Susceptibility	RTCA DO-160 D, E, F, G Sec. 11; MIL-STD-810 E, F, G Method 504
Steam Clean/Pressure Wash	SAE J1455 Sec. 4.5; DIN 40 050 Part 9 Sec. IP X9K
HAST	JESD22-A110-B; JESD22-A118
HALT	Qualmark Guideline 9.0

[1] *This accreditation covers testing performed at the main laboratory listed above, and the satellite laboratory listed below.*

[2] *Also using customer-specified methods directly related to the types of tests and parameters listed above.*

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Accreditation is granted to this satellite laboratory to perform the following tests:
Temperature, dust, sand, rain, humidity and solar radiation exposures are performed during durability cycling simulating actual environment; Microprocessors control chambers (sizes up to 144 ft^3) allowing automatic cycling and tracking of desired time, temperature, and humidity; Electrodynamic vibration systems – generate controlled sine or random vibration, sine-on random vibration control, random-on-random vibration control, transient vibration control, mechanical shock in sawtooth, half-sine & squared wave forms, field data replication, operating or non-operating mode environments (high or low temperature and humidity conditions can be applied); Thermal shock; HALT/HASS; Humidity; Condensing; Environmental cycling; Accelerated corrosion for the following types of industries: Aerospace; Defense; Telecommunications; Electrical; Electronics; Automotive; Information Processing and Scientific Instruments.

Test Description/ Parameters	**Test Method**
Corrosion Testing	ASTM G85
Corrosive Atmosphere/Mixed Flow Gases	ASTM B845; ASTM B827; JDQ 53.3; DS/EN 60068-2-60; IEC 60068-2-60; Ford ES-2L2T-14K147-AA
Salt Fog/Salt Spray	ASTM B117; ASTM D1735; ASTM D2247; DIN50021-SS; IEC 60945, Section 8.12; RTCA/DO-160, Section 14 (Category S & T); MIL-STD-202, Method 101E; MIL-STD-810, Method 509; MIL-DTL-5541F; SAE J1810, Section 5.7; GMW 3172, Section 9.4.8
Solar Radiation	JDQ 53.3 Section 8.1 Level 3; ISO 4892-2; ASTM G26-96; ASTM G155; ASTM D2565
Dust	IEC 60529, Section 13; MIL-STD-202, Method 110A; MIL-STD-810, Method 510, Procedure I; RTCA/DO-160, Section 12.4 (Category D); GMW 3172, Section 9.5.1

Test Description/ Parameters	**Test Method**
Blowing Sand	RTCA DO-160, Section 12.4; MIL-STD-810, Method 510, Procedure II
High and Low Temperature Range[2]: (-77 to 177) °C	IEC 60945, Sections 8.2, 8.4; MIL-STD-202, Method 108A; MIL-STD-810, Methods 501, 502, 521; RTCA/DO-160, Sections 4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 5, 24 (Categories A & C); SAE J1810, Section 5.1; GMW 3172, Section 9.4.1
Humidity Range[2]: (10 to 95) % RH	DIN 50017; IEC 60945, Sections 8.3; MIL-STD-202, Methods 103B, 106G; MIL-STD-810 Method 507; RTCA/DO-160, Section 6; GMW 3172, Sections 9.4.5, 9.4.6
Thermal Shock:	RTCA/DO-160, Section 6; IEC 60945, Sections 8.5; MIL-STD-202, Method 107G; MIL-STD-810, Method 503; GMW 3172, Section 9.42
Vibration: Range[2]: Up to 12 000 lbf (3 to 4000) Hz, 4 Inch Stroke, with Combined Environments of (-77 to 177) °C and (10 to 95) % RH Acceleration up to 100 *g*	IEC 60945, Section 8.7; MIL-STD 202, Methods 106G, 201A, 204D, 214A; MIL-STD-810, Methods 514, 516, Procedures IV, VI; MIL-STD-167; RTCA/DO-160, Section 8; SAE J1810, Section 5.5; GMW 3172, Section 9.3.1
Shock Range[2]: Force: Up to 210 *g* 1/2 Sine Period: < 1 ms to 35 ms at Terminal Peak	MIL-STD-202, Method 213B (higher levels need shock machine); MIL-STD-810, Method 514; MIL-STD-810, Method 516, Procedures I, II, III, and V; RTCA/DO-160, Sections 7.2, 7.3.1; SAE J1810, Section 5.4; GMW 3172, Sections 9.3.3, 9.3.4, 9.3.5
Altitude Range[2]: Up to 95,000 feet	RTCA/DO-160, Section 4; MIL-STD-810, Method 500
HALT/HASS Range[2]: Random Vibration (5 to 5000) Hz Level (0 to 85) g(pk) Temperature (-100 to 200) °C	GMW 8287; GMW 14906; Qualmark 933-0326, Section 10

Test Description/ Parameters	**Test Method**
Acceleration/Crash Safety Range[2]: Up to 20 *g*	MIL-STD-810, Method 513; RCTA DO-160, Section 7
Fungus	MIL-STD-810, Method 508; RCTA/DO-160, Section 13
Immersion	MIL-STD-810, Method 512; IEC 60945, Section 8.9; SAE J1810, Section 5.8
Explosive Atmosphere	MIL-STD-810, Method 511; RTCA/DO-160
Icing/Freezing Rain Waterproofness/IP testing	MIL-STD-810, Method 521; RTCA/DO-160, Section 24 RTCA DO-160, Section 10; DIN 40050 (Cat 5, 6, 5K, 6K, 9K); ISO 20653 (Cat 5, 6, 5K, 6K, 9K); IEC 60529 (Cat 5, 6, 5K, 6K, 9K)
Contamination by Fluids/Fluid Susceptibility	MIL-STD-810, Method 504; RTCA/DO-160, Section 11
Drop Test	IEC 60945, Section 8.6.1
Pressure Range[2]: Up to 3000 psi	RTCA/DO-160, Section 4.6; Element VC 202
Powered Temperature Cycling Test HAST/Accelerated Humidity	GMW 3172, Section 89.4.3 JESD22-A110B

[2] *Also using customer-specified methods directly related to the types of tests and parameters listed above.*

Accredited Laboratory

A2LA has accredited

ELEMENT MATERIALS TECHNOLOGY PORTLAND

Hillsboro, OR

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *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 April 2017*).

Presented this 18th day of January 2019.

Senior Director, Accreditation Services
For the Accreditation Council
Certificate Number 2582.01
Valid to January 31, 2021

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