Accredited Laboratory

A2LA has accredited

WESTMORELAND MECHANICAL TESTING & RESEARCH

Youngstown, PA

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 laboratory also meets the requirements of R223 – Specific Requirements: GE Aviation S400 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 13th day of November 2017.

President and CEO
For the Accreditation Council
Certificate Number 0621.01
Valid to September 30, 2019

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

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

WESTMORELAND MECHANICAL TESTING & RESEARCH, INC.[1]
221 Westmoreland Drive
Youngstown, PA 15696
Michael Self Phone: 724 537 3131
E-mail: mself@wmtr.com

MECHANICAL

Valid Until: September 30, 2019 Certificate Number: 0621.01

In recognition of the successful completion of the A2LA evaluation process (including compliance to R223 – Specific Requirements – GE Aviation S-400 Accreditation Program), accreditation is granted to this laboratory at the location listed above as well as the one satellite laboratory location listed below to perform the following tests on aircraft components, automotive components, fasteners, metals & alloys, and plastics & polymers:

Test Technology:	**Test Method(s):**
Bearing Strength	AITM 1-0009; ASTM D5961/D5961M, E238
Compression	ASTM E9
Ambient	AITM 1-0008; ASTM D695, D6484/D6484M, D6641/D6641M
Non-Ambient (-320 to 576) °F	ASTM D6641
Strain Measurement	ASTM D695, D6641
After Impact	ASTM D7137/7137M; EN 6038
Composites	
Ambient Temperature Tensile	ASTM D638, D3039/3039M, D5766/D5766M, D6742/D6742M; ISO 572
Non-Ambient Temperature Tensile (-320 to 576) °F	ASTM D638, D3039/3039M
Creep Rupture	ASTM E139
Drop Weight	ASTM E208
Dynamic Tear Strength	ASTM E604
Ductility (Bend, Formability)	ASTM E190, E290
Fatigue	
Crack Growth	ASTM E647
Axial, Flexural, Rotating Beam High / Low Cycle	ASTM E466, E606; NASM-1312-11
Flexural	
Ambient Temperature	ASTM C1161, D790, D7264/7264M
Non-Ambient Temperature	ASTM D7264/7264M

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Test Technology:	**Test Method(s):**
Flexural *(cont'd)*	
Strain Measurement	ASTM D790, D7264/7264M
Impact Strength	ASTM D7136/7136M
Double Lap Shear – Ambient Temperature	ASTM D3528
Double Lap Shear – Non-Ambient Temperature	ASTM D3528
Single Lap Shear – Ambient Temperature	ASTM D1002, D3163, D3164, D3165
Single Lap Shear – Non-Ambient Temperature	ASTM D1002
Fracture Toughness (-450 to 2100) ºF	ASTM E399, E1820, E1290 (Withdrawn 2013)[2]
Determination of the Opening Mode I Interlaminar Fracture Toughness, G_{Ic}, of Continuous Fiber-Reinforced Composite Materials	AITM 1-0005, 1-0053; ASTM D5528; EN 6033
K-R Curve Testing	ASTM E561
Hardness	
Brinell (10 mm – 500 & 3000 kg; 2.5 mm – 187.5 kg)	ASTM E10
Rockwell (A, B, C, E, F)	ASTM E18; NASM-1312-6
Superficial (15, 30, 45 N & T)	ASTM E18; NASM-1312-6
Vickers (5, 10 kg)	ASTM E92
Microhardness Knoop (10, 25, 50, 100, 200, 300, 500, 1000) gf Vickers (10, 25, 50, 100, 200, 300, 500, 1000) gf	ASTM E384; NASM-1312-6
High Pressure (Hydraulic) Burst	ABM 2-3026; AMS 4081, 4083, 4071; MIL-T-7081D
Impact (Charpy, Izod)	ASTM E23
Jominy	ASTM A255
Peel	
Peel (180º)	ASTM D903
T-Peel	ASTM D1876
Climbing Drum Peel	ASTM D1781
Floating Roller Peel	ASTM D3167
Shear / Double Shear	ASTM F606/F606M; NASM-1312-13, 1312-20
Ambient Temperature by SBS	ASTM D2344/D2344M
Ambient Temperature ±45 º Tension	ASTM D3518/D3518M
Ambient Temperature by Compression	ASTM D3846
Ambient Temperature by V Notch	ASTM D5379/D5379M, D7078/D7078M
Non-Ambient Temperature (-100 to 576) °F	ASTM D5379/D5379M, D7078/D7078M
Core Shear (-320 to 572) °F	ASTM C273/C273M
Stress Durability (Hydrogen Embrittlement)	ASTM F519; NASM-1312-5A
Stress Rupture	ASTM E139, E292; NASM-1312-10
Surface Roughness	ASME B46.1

Test Technology:	**Test Method(s):**
Tensile and Proof Load	ASTM E8/E8M, F606/F606M, E111; NASM-1312-8;
Tensile (1,000,000 lbs capacity)	ASTM A370, D638, E8/E8M, E21
Tensile Properties of Aluminum and Magnesium Alloy	ASTM B557
Sandwich Testing	
Flatwise Tension, Sandwich	ASTM C297; EN 6062
Sandwich Flexure	ASTM C393
Weld Operator and Procedure Qualification Testing	AWS D1.1, D1.2, D1.5, D4.0; ASME Sec. IX
Metallographic Evaluation	
Alpha Case	WMTR-7003
Banding / Identification of Microstructures	ASTM E1268; ASM Metals Handbook Vol. 9
Depth of Decarburization	ASTM E1077; SAE J121
Grain Size	ASTM E112
Inclusion Content	ASTM E45 (Methods A & D)
Micro & Macro Exam	ASTM E407, E340
Plating Thickness	ASTM B487; NASM-1312-12
Preparation	ASTM E3
SEM with Energy Dispersive Spectroscopy	ASTM E1508
Environmental Simulation	
CASS	ASTM B368
Corrosion Testing	
Exfoliation Corrosion	ASTM G34
Intergranular Corrosions Susceptibility	ASTM A262 (Methods A & E), G28
Pitting & Crevice Corrosion Susceptibility	ASTM G48
Stress Corrosion Cracking Susceptibility	ASTM G38, G39, G44, G47, G49
Humidity Exposure	MIL-STD-1312-3; NASM-1312-3
Salt Spray (Fog)	ASTM B117
Electrical Conductivity	ASTM E1004
Sieve Analysis of Metal Powders	ASTM B214

I. Dimensional Testing[3]:

Parameter	Range	CMC[4] (±)	Technique / Method
Linear	Up to 1 in Up to 6 in Up to 1 in Up to 1 in Up to 21 mm	0.00016 in 0.001 in 0.002 in 0.00002 in 0.0002 mm	Digital micrometers Digital calipers Digital & analog dial indicators Laser micrometer Scanning electron microscope
Angle	Up to 180 °	18 minutes	Comparator
Radii	Up to 10 in	0.0004 in	Comparator

[1]This accreditation covers testing performed at the main laboratory and the satellite laboratory listed below:

WESTMORELAND MECHANICAL TESTING & RESEARCH, INC.
14 Bay Hill Drive
Latrobe, PA 15650

Test Technology:	**Test Method(s):**
Tensile	
Tensile	ASTM E8/E8M, E21, E111, B557, F606/F606M; ISO 6892; NASM 1312-8
Fatigue Test (HCF) Room Temperature to 2200 °F	ASTM E466, E606; EN6072, 3988; ISO 1099; NASM 1312-11
Fracture Toughness Testing	ASTM E399, E1820; EN 2002-23; ISO 12737
K-R Curve Testing	ASTM E561
Electrical Conductivity	ASTM E1004
Bearing Strength	ASTM D5961/D5961M, D953, E238
Conditioning (Composites)	ASTM D5229
Constituent Content	ASTM D3171 (Method A, B, C, D, E, F, G), D3529

Test Technology:	**Test Method(s):**
Compression	
Strain Measurement	ASTM D695, D6641/D6641M
Plain, Open Hole and Filled Hole	ASTM D6484/D6484M
Edgewise / Flatwise Sandwich	ASTM C364/C364M, C365/C365M
Shear Loading	ASTM D3410/D3410M
Compression Set	ASTM D395
Compression After Drop Weight	ASTM D7137
Creep	ASTM E139, ASTM D2990
Density	ASTM B311
Fatigue	
Flexural	ASTM D7774
Uniaxial	ASTM D7791
Flammability	
Cabin and Cargo Component Materials	AMFTH CH 1, 2, 3
Flexural	
Plastics	ASTM D790
Ambient	ASTM C1161, D6272, D7249/D7249M; EN 2562
Non-Ambient Temperature	ASTM D7249/D7249M, ASTM D7264
Sandwich Flexure	ASTM C393
Sandwich Beam	ASTM D7250
Fracture Toughness	
Determination of the Opening Mode I	ASTM D5528
Mixed Mode	ASTM D6671/D6671M
Mode II Interlaminar Unidirectional	ASTM D7905/D7905M
Hardness	
Shore Hardness (A, D, M)	ASTM D2240
Rockwell Hardness	ASTM E18, D785
Barcol Hardness	ASTM D2583
Impact	
Drop Weight	ASTM D7136/D7136M
Charpy/IZOD Impact	ASTM E2248, D256, D6110; ISO 179, 180
Peel	
Adhesive Peel	EN 2243
Climbing Drum Peel	ASTM D1781
T-Peel	ASTM D1876
Floating Roller Peel	ASTM D3167
Peel (180º)	ASTM D903

Test Technology:	**Test Method(s):**
Shear	
Core Shear (-320 to 572) °F	ASTM C273/C273M
Ambient Temperature by SBS	ASTM D2344/D2344M; ISO 14130; EN 2377, EN 2563
Ambient Temperature ±45 º Tension	ASTM D3518/D3518M; ISO 14129
Ambient Temperature by Compression	ASTM D3846
Ambient Temperature by V Notch	ASTM D7078/D7078M
Plane -Strain Fracture Toughness	ASTM D5045
Lap Shear	ASTM D1002, D3163, D3164, D3165, D5379
Shear by Punch	ASTM D732
Specific Gravity	ASTM D792
Stress Durability (Hydrogen Embrittlement)	ASTM F519; NASM-1312-5A
Stress Rupture	ASTM E139, E292
Residual Stress by Hole Drilling Strain Gauge	ASTM E837
Tensile	ASTM D638, D3039, D5766, D6742; ISO 527
Flatwise Tension	ASTM C297, D7291
Vulcanized Rubber/Thermoplastic Elastomers	ASTM D412
PTFE	ASTM D1708
Thermal Analysis	
DMA (Dynamic Mechanical Analysis)	ASTM D7028
DSC (Differential Scanning Calorimetry)	ASTM D3418
TMA (Thermomechanical Analysis)	ASTM E831
Glass Transition (TG) Temperature	ASTM D7426; EN6032; ISO 11357-2
Specific Heat	ASTM E1269
Glass Transition Temperature	ASTM E1545, E1640
Coefficient of Linear Thermal Expansion	ASTM E228
Thermal Diffusivity by the Flash Method	ASTM E1461
TMA	ASTM E2092
Water Absorption	ASTM D570; ISO-62

[2]This laboratory's scope contains withdrawn or superseded methods. As a clarifier, this indicates that the applicable method itself has been withdrawn or is now considered "historical" and not that the laboratory's accreditation for the method has been withdrawn.

[3]This laboratory offers commercial dimensional testing services only. These tests are not equivalent to that of a calibration

[4]Calibration and Measurement Capability (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine measurements of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capabilities 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 measurement 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 measurement.

Accredited Laboratory

A2LA has accredited

WESTMORELAND MECHANICAL TESTING & RESEARCH

Youngstown, PA

for technical competence in the field of

Chemical 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 laboratory also meets the requirements of R223 – Specific Requirements: GE Aviation S400 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 13th day of November 2017.

President and CEO
For the Accreditation Council
Certificate Number 0621.02
Valid to September 30, 2019

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

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

WESTMORELAND MECHANICAL TESTING & RESEARCH, INC.
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Youngstown, PA 15696
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CHEMICAL

Valid To: September 30, 2019 Certificate Number: 0621.02

In recognition of the successful completion of the A2LA evaluation process (including compliance to R223 – Specific Requirements – GE Aviation S-400 Accreditation Program), accreditation is granted to this laboratory to perform the following metals and fastener tests on steel, stainless steel, aluminum & alloys, nickel & alloys, and titanium:

Test Technology:	**Test Method(s):**
Spectroscopy	
Atomic Absorption	ASTM E34, E1184
Ag, As, Ba, Bi, Cd, Cr, Ga, Ni, Pd, Sb, Se, Sn, Ta, Te, Tl, Zn	
Combustion / Fusion (LECO)	ASTM E1019, E1447, E1409, E1941, E1947
C, H_2, N_2, O_2 & S	
ICP	E2371, E2594, E3061, WMTR 5900
Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Li, Lu, K, Mg, Mn, Mo, Na, Nb, Nd, Ni, Os, P, Pb, Pd, Pr, Pt, Rb, Re, Rh, Ru, Sb, Sc, Se, Si, Sm, Sn, Sr, Tb, Tc, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr	
ICP MS	ASTM E2823
Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Li, Lu, K, Mg, Mn, Mo, Nb, Nd, Ni, Os, P, Pb, Pd, Pr, Pt, Rb, Re, Rh, Ru, Sb, Sc, Se, Si, Sm, Sn, Sr, Tb, Tc, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr	
Optical Emission Spectroscopy (OES)	ASTM E415, E1086, E1251
Al, Ag, Au, As, B, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Fe, Ga, Gd, La, Li, Mg, Mn, Mo, Na, Nb, Nd, Ni, P, Pb, Pr, S, Sb, Si, Sn, Sr, Ta, Te, Th, Ti, V, W, Y, Yb, Zn, Zr	

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