



Accredited Laboratory

A2LA has accredited

ELEMENT HUNTINGTON BEACH

Huntington Beach, CA

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 S-400 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 April 2017*).



Presented this 29th day of May 2018.

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

President and CEO
For the Accreditation Council
Certificate Number 93.02
Valid to May 31, 2020
Revised September 28, 2018

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



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ELEMENT HUNTINGTON BEACH
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MECHANICAL

Valid To: May 31, 2020

Certificate Number: 0093.02

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 types of metals tests:

<u>Test(s):</u>	<u>Test Method(s):</u>
Adhesion of Metallic Coatings on Fasteners	AMS 2399; MIL-C-83488; ASTM B571; SAE J207; AMSQQ-P-416A
Compression Strength	ASTM E9
<u>Aerospace Nut Tests:</u>	
Permanent Set Test of Self-locking Nuts	NASM 25027
Push-out Test of Floating Plate Nuts, Gang Channel Nuts and Anchor Nuts	NASM 25027
Reusability Test of Self-locking Internally Threaded Fasteners	AS 7250, 7251, 7252, 7253; BPS-N70; NAS 3350; NASM 25027; MIL-STD-1312-31
Torque Tests	MIL-DTL-18240
Torque-out Test	MIL-STD-1312-24, MIL-STD-1312-31
Wrench Torque Test of Externally Wrenched Nuts of Spline, Hexagon and Double Hexagon Wrenching Configuration	MIL-STD-1312-31; NASM 25027, 1312-31
<u>Coating Tests:</u>	
Measurement of Fastener Coating Thickness Microscopical Method	ASTM B487; MIL-STD-1312-12; NASM 1312-12
Weight of Coating	ASTM A90/A90M; MIL-STD-1312-12; NASM 1312-12
Abrasion Resistance	ASTM D4060
X-ray Method	ASTM B568

Test(s):**Test Method(s):****Corrosion Tests:**Copper Sulfate Test for Free Iron
on the Surface of Fasteners

ASTM A380; MIL-STD-753 (Method 102)

Humidity Testing

AMS-QQ-P-35; ASTM D2247; MIL-STD-753,
MIL-STD-810, MIL-STD-1312-3; NASM 1312-3

Intergranular Corrosion Susceptibility

ASTM A262, Practices A and E

Salt Spray (Fog)

ASTM B117; ISO 9227; NASM 1312-1;
MIL-STD-810, MIL-STD-1312-1

Exfoliation Corrosion

ASTM G34

Alternate Immersion Stress Corrosion

ASTM G38, G44, G47, G49; FED-STD-151b
(Method 823); MIL-STD 1312-9; NASM 1312-9

Hydrogen Embrittlement (Stress Durability)

AMSQQ-P-416; ASTM F519, F606/F606M;
SAE J81; MIL-STD-1312-5A; NASM 1312-5**Fatigue Testing:**Low Stress Grinding and Polishing¹

GE P1TF79

Linear-elastic Plane-strain Fracture
Toughness K_{IC} of Metallic Materials¹

ASTM E399

Crack Propagation¹

ASTM E647

Conducting Force Controlled Constant
Amplitude Axial Fatigue Tests of Metallic
Materials¹

ASTM E466; BS 3518-1, -3

Strain-controlled Fatigue Testing¹

ASTM E606/E606M

Residual Life Testing¹

GE C50TF57, C50TF12

High Cycle Fatigue (HCF)¹NAM 1312-111; MIL-STD-1312-11; NASM 1312-
11**Hardness Testing:**Rockwell (A, B, C, E, F, 15N, 30N, 45N,
15T, 30T, 45T)ASTM A370, E18, E140, F606/F606M; NASM
1312-6; ISO 898-1, 3738-1, 6508-1; MIL-STD-
1312-6; SAE J1199

Vickers (1 to 30) kg

ASTM E92

Brinell Hardness (500 Kg & 3000 Kg)

ASTM A370, E10

Heat Treat¹SOP 63.00²

Test(s):**Test Method(s):****Hardness Testing Continued:**

Microhardness (10-1000 HV, 10-1000 Knoop)	ASTM E384; MIL-STD-1312-6; NASM 1312-6
Jominy	ASTM A255
Prevailing Torque	IFI-100/107

Proof Load Tests:

Cone Proof of Internally Threaded Fasteners	ASTM A962/A962M, F606/F606M, F812/F812M; IFI 533; SAE J122
Proof Load of Full-size Externally Threaded Fasteners	ASTM A370, F606/F606M; ISO 898-1; JIS B1051; MIL-STD-1312-8; NASM 1312-8; SAE J429, J1216
Proof Load of Internally Threaded Fasteners	ASTM A370, F606/F606M; ISO 898-2, 898-6; JIS B1052, B1056; SAE J995, J1216; BPS-N-70
Rotational Capacity of Full-size Threaded Fasteners	ASTM A325/A325M ^{1,3} (withdrawn 2016)

Bearing

Pin-Type Bearing ¹	ASTM E238
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Screw Tests:

Drive Test	ASME B18.6.4 3; SAE J81, J933
Torsional Strength Test of Thread Rolling and Self Drilling Tapping Screws	ASME B18.6.4 3; SAE J78, J81, J933

Shear Strength of Externally Threaded Fasteners:

Double Shear	ANSI/ASME 18.8.2; ASTM B565; MIL-STD-1312-13; NASM 1312-13
Single Shear	ASTM F606/F606M; MIL-STD-1312-20; NASM 1312-20
Stress Rupture of Fasteners, Metals and Creep Rupture	ASTM E139, E292; MIL-STD-1312-10; NASM 1312-10

Tensile Strength:

Axial Tensile Strength of Full-size Threaded Fasteners & Metals	ASTM A370, F606/F606M; ISO 898-1, 6892; JIS B1051, J1054; MIL-STD-1312-8; NASM 1312-8; SAE J82, J429
Tension Testing of Machined Specimen from Externally Threaded Fasteners & Metals	ASTM A370, E8, F606/F606M; ISO 898-1; JIS B1051; MIL-STD-1312-8; SAE J429
Total Extension at Fracture of Externally Threaded Fasteners & Metals	ASTM F606/F606M; ISO 3506, 6892; JIS B1054

Test(s):

Tensile Strength Continued:

Wedge Tensile Strength of Full-size Threaded Fasteners

Yield Strength of Full-size Threaded Fasteners & Metals

Elevated Temperature Tensile Test

Test Method(s):

ASTM A370, F606/F606M; ISO 898-1, 6892; JIS B1051, D4604; MIL-STD-1312-8A, MIL-STD-1312-18A; NASM 1312-8, 1312-18; SAE J82, J429

ASTM A370, F606/F606M; ISO 898-1, 6892; JIS B1051, B1054; MIL-STD-1312-8A; SAE J429

ASTM E21; MIL-STD-1312-18; NAS 3350; NASM 1312-18, 25027

Torque Tension:

Recess Strength Test in Both Installation and Removal Directions

MIL-STD-1312-25; NASM 1312-25

Washer Tests:

Free Height/Compression/Flattening Test

FF-W-84, FF-W-100; ASME B18.21.1

Interlocking Test

FF-W-84

Twist Test of Lock Washers

ASME B18.21.1; FF-W-84

Metallurgical:

Decarburization and Case Depth

ASTM B487, E3, E384, E1077, F835, F2328, G79; ISO 898-1, 898-5, 4507; SAE J78, J121, J419, J423

Alpha Case

SOP 60.150²; GE P3TF19 & P3TF32

Inclusion Content of Steel

ASTM E45, Parts A & D

Grain Size

ASTM E112, E930, E1181; ISO 643; E50TF133

Macroscopic Examination by Etching¹

AMS 2380; ASTM A604, E340, E381; SAE J123, J1061

Microscopic Examination by Etching

AMS 2643; ASTM E407

Surface Discontinuities:

Externally Threaded Fasteners

ASTM A490, F788/F788M; ISO 6157-1, 6157-3; SAE J123, J1061

Internally Threaded Fasteners

ASTM F812, F812M; SAE J122

Bend Test¹

ASME IX; ASTM A615/A615M, E290

Charpy V-notch Impact Testing¹

ASTM A370, E23; BS EN 10045-1; JIS B1051

Scanning Electron Microscope

SOP 68.00², 68.10²

Magnetic Permeability Using a Low-mu Permeability Indicator

ASTM A342/A342M; MIL-I-17214

Test(s):

Weld & Braze Testing, Weld & Braze
Procedure Qualification Testing, Weld & Braze
Performance Qualification Testing:

Test Method(s):

Tension Test¹

ASME BPVC SEC IX; ASME B31.1, B31.3; ISO 15614, 4136; NAVSEA S9074-AW-GIB-010/248; JIS-B-8625; CGA C-3; AMS 2680, 2694; ASTM A488; API 1104, 5L, 5CT, 650; AWS D17.1, B2.1, B2.2, B4.0, D1.1, D1.2, D1.4, D1.5, D1.6, D1.9, D14.1, D15.1, D18.1

Bend¹

ASME BPVC SEC IX, ASME B31.1, B31.3; ISO 15614, 9606, 5173; NAVSEA S9074-AQ-GIB-010/248; JIS-B-8625, CGA C-3; ASTM A488, E190; API 1104, 5L, 650; AWS D17.1, B2.1, B4.0, D1.1, D1.2, D1.3, D1.5, D1.6, D1.9, D14.1, D15.1, D18.1

Fracture Toughness¹

ASME BPVC SEC IX; ISO 9606; JIS-B-8625; API 1104

Nick Break¹

API 1104

Weld Macro¹

ASME BPVC SEC IX; ISO 15614, 17639; NAVSEA S9074-AW-GIB-010/248; JIS-B-8625; GCA C-3; ASTM A488, E190; API 1104, 5L, 650; AWS D17.1, B2.1, B4.0, D1.1, D1.2, D1.3, D1.5, D1.6, D1.9, D14.1, D15.1, D15.2, AWS D18.1

Impact¹

ASME BPVC SEC IX, ASME BPVC SEC III-DIV 1, ASME BPVC SEC VIII-DIV 1, ASME B31.1, B31.3; ISO 15614, 148-1, 9016; NAVSEA S9074-AQ-GIB-010/248; JIS-B-8625; ASTM A488; API 1104, 5L, 5CT, 650, 620; AWS B4.0, D1.1, D1.5, D14.1, D15.1

Hardness

ASME BPVC SEC IX; ISO 15156, 1514, 9015; NAVSEA S9074-AQ-GIB-010/248; JIS-B-8625; API 5L, 5CT, 650; AWS D15.2

Post Weld Heat Treat¹

ASME BPVC SEC IX, ASME BPVC SEC II-DIV 1, ASME BPVC SEC VIII-DIV 1, ASME B31.1, B31.3; JIS-B-8625; AWS D1.1, D1.5

Weld Chem Ferrite Number

ASME BPVC SEC III-DIV 1, ASME BPVC SEC VIII-DIV 1; AWS D1.6

Bend Break¹

CGA C-3; AWS D17.1, B2.1, D4.0, D1.1, D1.6

Tensile Shear/Lap Shear¹

NAVSEA S9074-AQ-GIB-010/248; AWS D17.2, B2.2, B4.0

Test(s):

Weld Peel

Welded Pipe/Vessel Flattening Test

Non-Destructive Testing:Magnetic Particle Inspection
(Wet Fluorescent)

Penetrant (Water Washable Fluorescent)

Weld Visual

Test Method(s):

AWS D17.2

CGA C-3; API 5L, 5CT

ASTM E1444; MIL-STD-1949, MIL-STD-271F;
T9074-AS-GIB-010/271ASTM E1417; MIL-STD-271F, MIL-STD-6866;
T9074-AS-GIB-010/271ASME BPVC SEC IX, ASME BPVC SEC III-DIV
1, ASME BPVC SEC VIII-DIV 1, ASME BPVC
SEC V, ASME B31.1, B31.3; ISO 15614, 9606;
NAVSEA S9074-AQ-GIB-010/248; JIS-B-8625;
AWWA D 100; AMS 2680; API 1104, 650, 620;
AWS D17.1, D17.2, B2.1, D1.1, D1.2, D1.4, D1.5,
D1.6, D1.9, D14.1, D14.3, D15.1, D18.1

¹ Specimens machined or heat treated at the following address: 15678 Graham Street Huntington Beach, CA 92649

² Laboratory developed method

³ 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.