



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017⁴

ELEMENT CLEVELAND
5405 East Schaaf Road
Cleveland, OH 44131
Jeffry J Smith Phone: 216 524 1450
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MECHANICAL

Valid To: September 30, 2020

Certificate Number: 0100.01

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 to perform the following tests on metals, threaded fasteners, wire, tube, lifting gear, welded chain, wire rope and fittings, springs, and energy absorbing devices and products:

<u>Test</u>	<u>Test Method(s)</u>
Coatings, Conversions and Platings Coating Thickness	ASTM B487, B748 EN ISO 1463; NASM 1312-12
Conductivity	ASTM E1004
Hydrostatic Pressure Tests (0 to 40,000) psi	SOP 44.00 ¹
Mechanical Tests of Metals and Metal Products	
Bend	ASTM E190, E290; AWS B4.0, D1.1, D1.2, D1.5; DIN EN 910
Compression	SOP 39.50 ¹
Creep	ASTM E139
Fracture Toughness	ASTM B909, E399
Hardenability (Jominy)	ASTM A255
Hardness	
Rockwell (A, B, C, E, F, 15N, 30N, 45N, 15T, 30T, 45T)	ASTM E18; EN 1043-1; EN 10109-1; EN ISO 6508; NASM 1312-6
Brinell (500, 1000, 1500 and 3000) kgf	ASTM E10; DIN EN 10003-1; EN ISO 6506
Hydrogen Embrittlement	ASTM F606, F606M; NASM 1312-5, 1312-14
Impact (-425 to 1,700) °F	ASTM E23; DIN 50115; DIN 10045-1; ISO 83
Magnetic Permeability	ASTM A342/A342M (Method 3)
Microhardness	
Knoop (100 to 500) gf	ASTM E384, E92; NASM 1312-6
Vickers (300, 500, 100gf, 10, 30kgf)	ASTM E384, E92; NASM 1312-6
Room Temperature Stress Rupture	ASTM F519

<u>Test</u>	<u>Test Method(s)</u>
Proof Load Tests	
External	ASTM A370, F606/F606M; NASM 1312-8; ISO 898-1
Internal	ASTM A962/A962M, F606/F606M; EN 493; ISO 898-2, 10485
Proof Load of Full Size Eyebolts	ASTM A489
Shear	ASTM B565, F606/F606M; NASM 1312-13, -20
Stress Rupture (Elevated Temperature)	ASTM E139, E292; NASM 1312-10
Tensile Strength (Room Temperature)	ASTM A370, B557, E8/E8M, E21, E517; DIN 895, 10237; DIN 20125, 50140; ISO 6892-1, 6892-2; NASM 1312-8
N Value	ASTM E646
R Value	ASTM E517
Tensile Strength (Elevated Temp, Up to 2000°F)	ASTM E21; EN 10002-5; NASM 1312-18
Tension (Axial and Wedge)	ASTM A370, F606/F606M; ISO 898-1
Metallography and Micrography of Ferrous and Nonferrous Materials	
Alpha Case	AMS 4928, 4965
Carburization	SAE J121
Carbide Microstructure	ASTM B276, B390, B657, B665; SAE J439
Case & Core Hardness	ASTM F606/F606M; SAE J78, J429; NASM 1312-6
Case Depth	SAE J423
Corrosion Resistance	ASTM A262 (Methods A, C & E), A923 (Methods A & C), G48, G28 (Method A); DIN 50914; EN ISO 3651, 6957
Decarburization	ASTM E1077, F835; SAE J121
Delta Ferrite	AMS 2315; ASTM E562
Grain Size	ASTM E112, E930, E1181
Graphite Type and Distribution	ASTM A247
Macroscopic Examination	ASTM A561, A604, E381, AMS 2433, GM4460P
Microcleanliness	ASTM E45 (Method A, D), E766; DIN 50602; SAE J422
Photomicrography	ASTM E883
Surface Discontinuities	ASTM F788; SAE J122, J123, J1061
Surface Finish	ASME B46.1
Pneumatic Pressure Tests (0 to 6000) psi	SOP 44.00 ¹
Sample Heat Treatment	AMS 2750; SOP 39.00 ¹
SEM/EDS	ASTM E1508; SOP 60.36 ¹
Weld Examination	ASME Sect. IX; API 1104; AWS D1.1/D1.1M, D1.2/D1.2M, D1.3/D1.3M, D1.4/D1.4M, D1.5/D1.5M, D1.6/D1.6M, D14.1/D14.1M, D14.3/D14.3M, D14.4/D14.4M, D14.6/D14.6M, D15.1/D15.1M, D17.1/D17.1M; DIN EN ISO 9606-1, 9606-2; ISO 15614-1, 15614-2

Test

Test Method(s)

Failure Analysis:

Using the methods listed above and on scopes of accreditation 0100.02 and 0100.10 in accordance with ASM Handbook Volume II.

Dimensional Testing²:

Parameter	Range	CMC ³ (±)	Technique/Standards
Linear (1D)	Up to 1.000 in	0.0004 in	Micrometers / ASME B18.3 and per Customer Requirements
	Up to 6.000 in	0.002 in	Calipers, digital / ASME B18.3 and per Customer Requirements
	Up to 8.000 in	0.0003 in	Optical comparator / ASME B18.3 and per Customer Requirements
Angle	Up to 360 °	0.5 °	Optical comparator / ASME B18.3 and per Customer Requirements
Radius	(0.005 to 2.500) in	0.001 in	Optical comparator / ASME B18.3 and per Customer Requirements

¹ In-house test procedure.

² This laboratory offers commercial dimensional testing services. These tests are not equivalent to that of a calibration.

³ 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.

⁴ This laboratory also meets the requirements of ISO/IEC 17025:2005.





Accredited Laboratory

A2LA has accredited

ELEMENT CLEVELAND

Cleveland, OH

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 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 9th day of November 2018.

A handwritten signature in blue ink, appearing to be "L. M. ...".

President and CEO
For the Accreditation Council
Certificate Number 0100.01
Valid to September 30, 2020
Revised January 21, 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 17025:2017²

ELEMENT CLEVELAND
5405 East Schaaf Road
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CHEMICAL

Valid To: September 30, 2020

Certificate Number: 0100.02

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 tests on metals:

<u>Test</u>	<u>Test Method(s)</u>
Combustion Analysis (C, S) Low Alloy Steel Base Alloys, Stainless Steel Base Alloys, Ni Base Alloys, Co Base Alloys, Ti Base Alloys Exclusions: S in Ti Base, S in Co Base	ASTM E1019, SOP 10.04 ¹
Inert Gas Fusion (N, O) Low Alloy steel Base Alloys, Stainless Base Alloys Ni Base Alloys, Co Base Alloys, Cu Base Alloys	ASTM E1019, SOP 10.08 ¹
Inert Gas Fusion (N,O) Ti Base Alloys	ASTM E1409, SOP 10.08 ¹
Inert Gas Fusion (H ₂) Ti Base Alloys	ASTM E1477, SOP 10.09 ¹
Optical Emission / ICP Fe Base Alloys (Al, B, Co, Cr, Cu, Mn, Mo, Nb, Ni, P, Si, Ti, V, W)	ASTM D1976, E1479, D1976, SOP 10.30 ¹ ,
Stainless Steel Base Alloys (Al, B, Co, Cr, Cu, Mn, Mo, Nb, Ni, P, Si, Ti, V, W)	ASTM D1976, E1479, D1976, SOP 10.30 ¹ , SOP 10.21 ¹
Al Base Alloys (Be, Cr, Cu, Fe, Mg, Mn, Ni, Pb, Si, Sn, Ti, V, Zn, Zr)	ASTM D1976, E1479, D1976, SOP 10.30 ¹ , SOP 10.20 ¹
Ni Base Alloys (Al, Co, Cr, Cu, Fe, Mn, Mo, Nb, P, Si, Ti, W, Zr)	ASTM D1976, E1479, D1976, SOP 10.30 ¹ , SOP 10.19 ¹

<u>Test</u>	<u>Test Method</u>
Co Base Alloys (Al, Cr, Cu, Fe, Mn, Mo, Nb, Ni, P, Si, Ti, V, W)	ASTM D1976, E1479, D1976, SOP 10.30 ¹ , SOP 10.24 ¹
Cu Base Alloys (Al, Be, Co, Cr, Fe, Mn, Ni, P, Pb, Si, Sn, Zn)	ASTM D1976, E1479, D1976, SOP 10.30 ¹ , SOP 10.23 ¹
Ti Base Alloys (Al, Cr, Cu, Fe, Mn, Mo, Ni, Si, Sn, V, Zr)	ASTM D1976, E1479, D1976, E2371, SOP 10.301, SOP 10.25 ¹
Mg Base Alloys (Al, Cr, Cu, Fe, Si, Mn, Ni, Pb, Sn, Zn, Zr)	ASTM D1976, E1479, D1976, SOP 10.301, SOP 10.29 ¹
Optical Emission / Spark	
Low Alloy Steel Base Alloys (Al, B, C, Cr, Cu, Mn, Mo, Ni, P, S, Si)	ASTM E415, SOP 10.05 ¹
Stainless Steel Base Alloys (Al, C, Cr, Co, Cu, Mn, Mo, N, Nb, Ni, P, S, Si, Ti, V, W)	ASTM E1086, SOP 10.05 ¹
Al Base Alloys (Be, Bi, Cr, Cu, Fe, Mn, Mg, Ni, Pb, Si, Sn, Ti, V, Zn, Zr)	ASTM E1251, E607, SOP 10.05 ¹
Ni Base Alloys (Al, C, Co, Cr, Cu, Fe, Mo, Mn, Nb, P, Si, Ta, Ti, W, Zr)	SOP 10.05 ¹
Co Base Alloys (Al, C, Cr, Cu, Fe, Mo, Mn, Nb, Ni, P, S, Si, V, W)	SOP 10.05 ¹
XRF	
Low Alloy Steel Base Alloys (Al, Co, Cr, Cu, Mn, Mo, Nb, Ni, P, Pb, Si, Sn, Ti, V)	ASTM E322, E1086, SOP 10.07 ¹
Stainless Steel Base Alloys (Co, Cr, Cu, Mn, Mo, Nb, Ni, P, Si, Ta, Ti, V, W)	ASTM E572, E1086, SOP 10.07 ¹
Ni Base Alloys (Al, Co, Cr, Cu, Fe, Mn, Mo, Nb, P, Si, Ta, Ti, V, W, Zr)	SOP 10.07 ¹
Cu Base Alloys (Ag, Al, Co, Cr, Fe, Mn, Ni, P, Pb, S, Sn, Zn)	SOP 10.07 ¹
Ti Base Alloys (Al, Cr, Cu, Fe, Mn, Mo, Nb, Ni, Si, Sn, V, Y, Zr)	ASTM E539, SOP 10.07 ¹
Graphite Furnace Atomic Absorption	
Ni Base Alloys (Ag, Bi, Pb, Se, Te, Tl)	ASTM E1184, SOP 10.40 ¹

¹ In-house test procedure.

² This lab also meets the requirements of ISO/IEC 17025:2005.



Accredited Laboratory

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ELEMENT CLEVELAND

Cleveland, OH

for technical competence in the field of

Chemical 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 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 9th day of November 2018.

A blue ink signature of the President and CEO.

President and CEO

For the Accreditation Council

Certificate Number 0100.02

Valid to September 30, 2020

Revised January 21, 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 17025:2017²

ELEMENT CLEVELAND
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NONDESTRUCTIVE

Valid To: September 30, 2020

Certificate Number: 0100.10

In recognition of the successful completion of the A2LA evaluation process (including R212 - Specific Requirements: Nondestructive Testing Laboratory Accreditation Program), accreditation is granted to this laboratory to perform the following tests on metals and alloys:

<u>Test</u>	<u>Test Method(s)</u>
Liquid Penetrant (Visible & Fluorescent)	ASTM E165/E165M, E1417/E1417M; ASME Sec. V, Art. 6; DIN EN 571-1 (Superseded 1997) ¹ ; DIN EN ISO 3452-1; MIL-STD-271F (Cancelled 1998) ¹ ; MIL-STD-6866 (Withdrawn 1996) ¹ ; NAVSEA T9074-AS-GIB-010/271
Magnetic Particle (Including Rating of Non-Metallic Inclusions) Yoke – Visible / Fluorescent (Wet / Dry) Bench (Wet Fluorescent)	AMS 2300, 2301, 2303, 2640; ASME Sec. V, Subsection A, Art. 7; ASTM E1444/E1444M, E709; MIL-STD-271F (Cancelled 1998) ¹ ; MIL-STD-1949A (Cancelled 1995) ¹ ; MIL-STD-6868 (Cancelled 1988) ¹ ; NAVSEA T9074-AS-GIB-010/271
Radiography (X-ray & Film only)	ASME Sec. IX, Sec. V, Art. 2; ASTM E1742/E1742M; AWS D1.1; DIN EN 1435 (Superseded 2002) ¹ ; DIN EN ISO 17636-1, -2; MIL-STD-271F (Cancelled 1998) ¹ ; MIL-STD-453C (Cancelled 1996) ¹ ; NAVSEA T9074-AS-GIB-010/271
Ultrasonic (Contact only) (Straight Beam & Angled Beam)	AMS-STD 2154; ASME Sec. V, Art. 4 & 5; ASTM A388/A388M, A571, A578; MIL-STD-271F (Cancelled 1998) ¹ ; MIL-STD-2154 (Cancelled 2009) ¹ ; NAVSEA T9074-AS-GIB-010/271; SA577, SA578

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¹ This laboratory's scope contains cancelled 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.

² This laboratory also meets the requirements of ISO/IEC 17025:2005.

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Accredited Laboratory

A2LA has accredited

ELEMENT CLEVELAND

Cleveland, OH

for technical competence in the field of

Nondestructive 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 laboratory also meets the requirements of R212 – Specific Requirements – Nondestructive Testing Laboratory Accreditation. 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 9th day of November 2018.

A blue ink signature of the President and CEO, written over a horizontal line.

President and CEO
For the Accreditation Council
Certificate Number 0100.10
Valid to September 30, 2020
Revised January 21, 2019

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