



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

TENSILE TESTING METALLURGICAL LABORATORY
4520 Willow Parkway
Cleveland, OH 44125
James E Rauckhorst Phone: 216 641 3290

CHEMICAL

Valid To: May 31, 2013

Certificate Number: 0161.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests on aerospace, nuclear, automotive parts, bar, forgings, castings, fasteners, medical implants, heat treated parts, eyebolts, weldments, coatings, paint, billets, stampings, rebar, wire, buckles, shackles, hitches, hooks, chains, cargo rings, clevis, turnbuckles, inserts and tubular products²:

<u>Test</u>	<u>Test Methods¹</u>
<u>Spectroscopy</u> Optical Emission Spectrochemical Analysis - Argon Path (OES) (Al, As, B, Bi, C, Cb, Co, Cr, Cu, Mg, Mn, Ni, P, Pb, Sb, Sn, Ti, V, W, Zn)	TTML C-01; ASTM E415, E1086, E1251, E1999
<u>Combustion</u> LECO Carbon and Sulfur Analyzer (C, S)	ASTM E1019
LECO Oxygen, Nitrogen, and Hydrogen Analyzer (O,N,H)	ASTM E1019, E1447

¹Also using industry and customer driven specifications specifically related to the testing above.

²On the following materials: Aluminum, Carbon and Alloy Steel, Copper Alloys (Brass, Bronze), Titanium, Cobalt, Superalloys, Tool Steels, Nickel Alloys, Hadfield Manganese and Stainless Steels.



World Class Accreditation

The American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

TENSILE TESTING METALLURGICAL LABORATORY

Cleveland, OH

for technical competence in the field of

Chemical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *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 27th day of April 2011.

A handwritten signature in black ink, appearing to read "Peter Abney", written over a horizontal line.

President & CEO
For the Accreditation Council
Certificate Number 0161.01
Valid to May 31, 2013

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



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MECHANICAL

Valid To: May 31, 2013

Certificate Number: 0161.02

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<u>Test</u>	<u>Test Methods*</u>
<u>Mechanical:</u>	
Ball Punch Deformation (Olsen, Erichsen)	ASTM E643
Bend Test	ASTM A370, A489, B571, E190, E290
Charpy Impact	ASTM A370, A923 (Method B), E23; ISO 083; EN 10045-1
Compression	ASTM E9
Flare Test	ASTM A370 (Sec. A2.5.1.4)
Flattening Test	ASTM A370 (Sec. A2.5.1.1)
Fracture Toughness	ASTM E399
<u>Hardness:</u>	
Brinell	ASTM E10
Rockwell / Superficial Rockwell ¹ (HRA, HRBw, HRC, HRD, HREw, HRFw, HRGw, HRHw, HRKw, HR15Tw, HR30Tw, HR45Tw, HR15N, HR30N, HR45N)	ASTM E18, F606; NASM 1312-6
Jominy Hardenability	ASTM A255; SAE J406
Microhardness (Knoop, Vickers)	ASTM E384, F606; NASM 1312-6
Stress Rupture w/ Smooth, Notch and Combination Bars	ASTM E139, E292

*Also using industry and customer driven specifications specifically related to the testing above.

TestTest Methods*Mechanical (continued):

Tensile

Room Temperature (up to 400K for Ultimate Tension, Yield, Modulus)

ASTM A48, A370, A770, B557, E8, E8M; NASM 1312-8; EN 10002, 10164; JIS Z2201, Z2241; DIN 50125

R Value

ASTM E517

N Value

ASTM E646

Elevated Temperature (up to 1600 °F)

ASTM E21; NASM 1312-18

Fastener:

Discontinuities

ASTM F788, F812; SAE J122, J123

Ductility

SAE J78, J81

Hydrogen Embrittlement / Debrittlement Verification (Stress Durability)

ASTM F519, F606; NASM 1312-5
USCAR-5, USCAR-7

Prevailing Torque

IFI 100/107

Proof (Internal & External Threads)

ASTM A370, F606; SAE J429, J995

Rotational Capacity

ASTM A325 (Sec. 10.2); AASHTO M164

Tensile

Axial Tensile

ASTM F606, F606M

Wedge Tensile

ASTM F606, F606M

Screw Thread Insert

MIL-I-45914A

Shear / Double Shear

ASTM F606; NASM 1312-13, NASM 1312-20

Torque Tension

ISO 16047

Torque Testing

ASTM F738 (Sec. 10.2.4), F880 (Sec. 12.3), F912 (Sec. 11.2); IFI 101

Turnbuckle Test

ASTM F1147

Metallographic Evaluation:

Alpha Case

ASTM E3, E407; TTML LI-019

Banding / Orientation of Microstructures

ASTM E1268; ASM Handbook (Vol. 9)

Case Depth

SAE J423

Carburization

SAE J121

Dendritic Arm Spacing

ARP 1947

Depth of Decarburization / Chord Method

ASTM A574, E1077, F2328; SAE J121, SAE ARP 1820

Ferrite Rating

AMS 2315

Graphite in Castings / Nodularity

ASTM A247; GM9095P

*Also using industry and customer driven specifications specifically related to the testing above.



Test

Test Methods*

Metallographic Evaluation (continued):

Grain Size	ASTM E112, E930
Inclusion Rating / Microcleanliness	ASTM E45 (Method A & D)
Metallographic Specimen Preparation	ASTM E3
Macro / Micro Etch	ASTM A604, E340, E381, E407
Photomicrography	ASTM E883
Plating Thickness / Coating Thickness	ASTM B487

Material Property Analysis:

Coating Weight	ASTM A90, A309, A428; NASM 1312-12
Conductivity	ASTM E1004
Surface Roughness / Surface Finish	ASME B46.1

Corrosion:

Corrosion Test	ASTM A923 (Method A & C)
Intergranular Corrosion (IGA)	ASTM A262 (Practice A & E)
Salt Spray	ASTM B117

Other:

Failure Analysis (using the listed test technologies)	TTML LI-011
Heat Treat ²	SAE-AMS-H6875, AMS 2750
Weld Evaluation – PQR, WPS, Side Bend, Root Bend, Face Bend	ASME Section IX, AWS D1.1, D1.5

*Also using industry and customer driven specifications specifically related to the testing above.

¹Heat Treatment Performed Only on Samples Prior to Testing. (Heat Treat Capability) including age, anneal, austenitize, bake, heat resistance, normalize, PWHT (Post Weld), stress relieve, quench & temper, 24 hour on nuts.

²On the following materials: Aluminum, Carbon and Alloy Steel, Copper Alloys (Brass, Bronze), Titanium, Cobalt, Superalloys, Tool Steels, Nickel Alloys and Stainless Steels.





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